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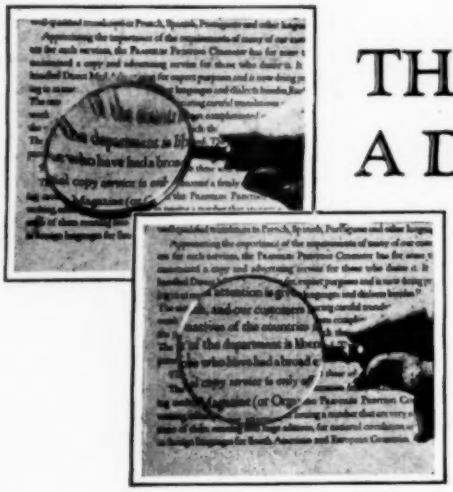

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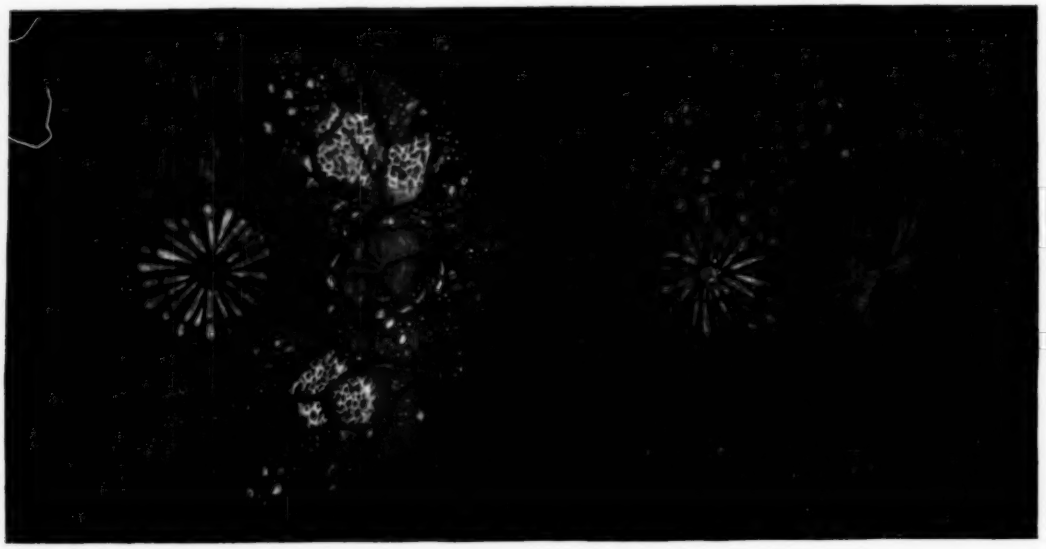

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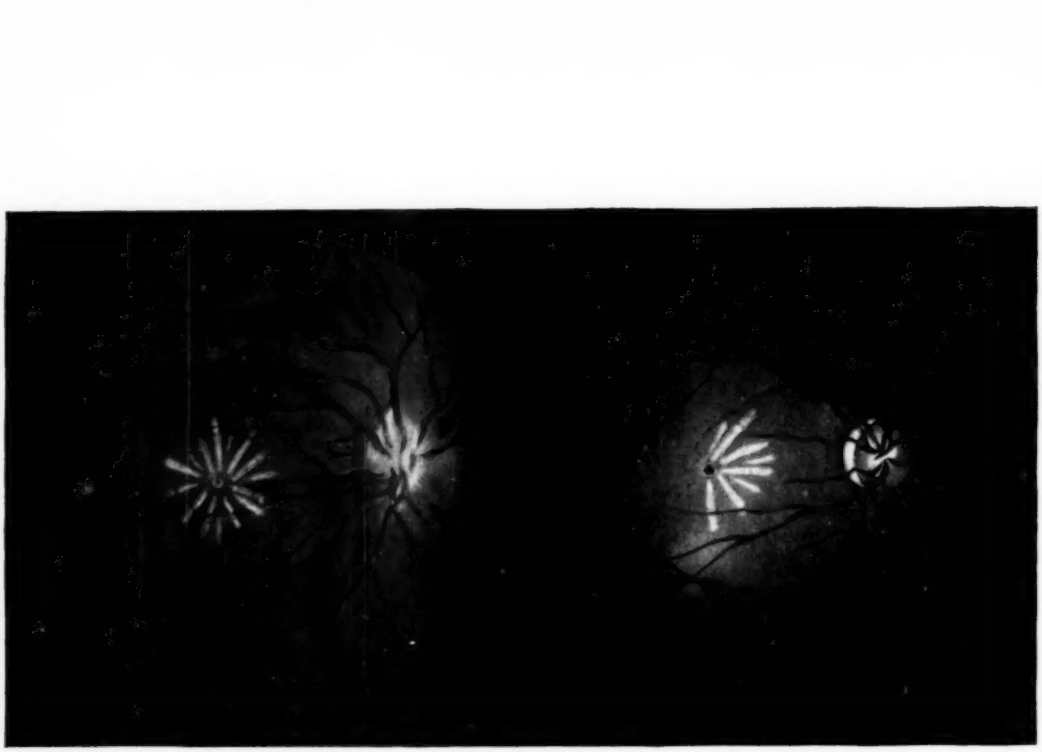

CASE 3 CASE 6

MACULAR STAR IN NONRENAL CASES (F. PHINIZY CALHOUN).

AMERICAN JOURNAL OF OPHTHALMOLOGY

Volume 14 February, 1931 Number 2

OBSERVATIONS ON THE FORMATION OF MACULAR STAR IN NONRENAL CASES

F. PHINIZY CALHOUN, M.D., F.A.C.S.
ATLANTA

In the six cases described, macular star was respectively due to neuroretinitis associated with probable acute hyperpituitarism; to neuroretinitis in the toxemia of pregnancy; to papilledema in association with hypophyseal syphilis; to neuroretinal edema in relation with suspected thrombosis and endocrine imbalance; to papilledema with suspected cerebellar tumor; and to commotio retinæ with macular hemorrhage. (See color drawings in frontispiece to this issue.) Read (by invitation) before the Medical Society of the State of North Carolina, April, 1930.

It is commonly known that the macular star is frequently observed in conditions other than nephritis.

From an ophthalmoscopic examination it is often difficult to differentiate the true and false type of "albuminuric retinitis", except for the vascular changes in the retina which accompany the true type. This same difficulty follows in the histopathological examination (Verhoeff).

We must then agree with Frost "that our present knowledge of retinal exudates points to the conclusion that identical ophthalmoscopic appearances may be due to different pathological processes".

My interest in the subject is due to the fact that I was able to observe several cases in their early stages and to follow them to their termination. My interest was further aroused by having the formation of this macular star satisfactorily explained to me, upon the basis of a theory which I fear has never been duly appreciated. I refer to an article by Mr. Marcus Gunn "On the changes in the macula associated with retinal inflammations and edema", published in 1894.

Case 1: Bilateral neuroretinitis with macular stars; paralysis right abducens; suspected acute hyperpituitarism.

K. W., female, aged fourteen years, seen July 1, 1922, complaining of double vision for two days and poor sight in the right eye for three weeks. There was present a right sixth nerve paralysis and marked bilateral neuroretinal edema, with a few unsymmetrical macular exudates in each eye. The vision was less than 20/200. On account of obesity (150 pounds) and a history of amenorrhea, a hypophyseal lesion was suspected. The history revealed vomiting spells at the onset, but no headache, convulsions, polyuria, or polydipsia.

A general and neurological examination was negative, except that the thyroid was enlarged. The urine, the spinal fluid, and the blood chemistry were normal. The blood and spinal Wassermann tests were negative. The x-ray showed an enlarged sella turcica and indistinct clinoid processes. The floor appeared eroded. There was a convolutional atrophy and diastasis of the sutures as evidence of increased intracranial pressure.

The eye examination on July 10, 1922, showed that the right disc was blurred, margin and cup being invisible. The veins were slightly distended. The arteries were normal. A connective tissue veil was noted over the disc. Along the course of the superior temporal vessels and three disc diameters from the disc was an indistinct area of edema in which the veins were lost. In the macular region was a perfectly formed star with a clear reddish center. Surrounding the disc were several crescent-shaped exudates with other scattered exudates of irregular form. In some places these exudates looked like impressions on the retina from the

choriocapillaris. They were all placed in the deeper retinal layers. There were no hemorrhages. The left eye was similar.

Two months later the vision was normal. The exudates had almost entirely absorbed. Extending from the disc towards the macula were seen two brownish lines resembling angioid streaks, which may have been blood in the perivascular spaces of the short posterior ciliary vessels, as has been suggested by Treacher Collins.

Two years later vision was still normal, menstruation having been established at that time. Fine macular changes were detected and the connective tissue veil over the disc was still present.

In this case the delayed menstruation, the increase in weight, the enlarged thyroid gland and sella turcica, and the eye findings strongly suggested an acute hypophyseal swelling, causing increased intracranial pressure and its attending papilledema.

Not until the neuroretinal edema had subsided, relieved largely by spinal drainage, did the exudates appear in number, or did they assume a stellate arrangement in the macula or crescent-shaped forms around the disc.

Case 2: Bilateral neuroretinitis, with macular stars; nephritis from toxemia of pregnancy.

E. N., aged thirty years, complained of defective vision in both eyes since the birth of her last child three months previously. There had been six pregnancies, two of which had been miscarriages. In the last confinement the labor had been normal; she had been attended by a midwife. Several days before confinement she had complained of dizziness and headaches, and on the second day following labor she had been able to see only light.

The physical examination was negative except for a subinvoluted uterus. The blood pressure was 185/120. The urine contained albumin and hyalin casts, and the specific gravity was 1030.

The eye examination showed vision of the right eye to be fingers at three feet; of the left eye, 10/200. The discs and surrounding retina showed edema. There were a few flamelike hemorrhages along the larger vessels. Both maculæ were involved, but the right was the worse, for it contained a perfectly formed star with a glistening yellow center. Scattered throughout the retina and extending far into the periphery were numerous glistening punctate opacities, all of which were in the deeper layer of the retina. One month later vision had improved to 15/200 on the right and 15/30 on the left; the edema had completely subsided and the exudates were absorbing. Rapid improvement was being noted in the urine and blood pressure.

It is very probable that marked intraocular changes existed prior to confinement. The facts that the exudates were in the deeper layers of the retina and that there was present a deep central macular exudate suggested an involvement of the choroid, which is common in "pregnancy retinitis".

Case 3: Bilateral papillitis, with a macular star; hypophyseal syphilis.

S. W., an unmarried female, aged twenty-four years, complained of defective vision of two months' duration. The outstanding facts in the history were: (1) increase in weight from 190 pounds at the age of eighteen years to the present weight of 255 pounds; (2) polyuria; (3) polydipsia; (4) bitemporal headaches; (5) irregular and scant menstruation for five years; and (6) anaphrodisia.

From a careful physical and neurological examination it was agreed that there was definite evidence of a hypophyseal disturbance without hemianopsia.

The eye examination showed a five diopter swelling of the right disc; the formation of new tissue on the disc was interpreted as evidence that this edema had existed for some time. There were a few small hemorrhages above the disc and a few yellowish dots arranged in radiating lines in the macular region. There was no pigmentation in the choroid or retina suggesting congenital syphilis. The left disc was less swollen, and the retina was free of hemorrhages,

exudates, and pigmentation. Following a subtemporal decompression, at which time a ventricular drainage was made (the fluid giving a strongly positive Wassermann reaction), the macular star increased in the right eye as the edema of the retina and disc subsided. No exudates formed in the left eye. During convalescence an acute plastic iritis developed in the left eye and several months later a mild serous uveitis appeared. Under antiluetic treatment and glandular feeding vision was regained and many of the symptoms comprising Fröhlich's syndrome improved.

We note here that the macular star had formed in the presence of a papillitis, and as the edema subsided, aided by drainage and decompression, the figure increased and then finally absorbed. A papilledema superimposed upon a papillitis may have been the double picture consequent to a dual intracranial disorder of cerebral syphilis involving the hypophysis.

Case 4: Unilateral neuroretinal edema, with macular star; suspected incomplete thrombosis and endocrine imbalance.

J. W., female, aged thirteen years, was first seen April 9, 1921. The complaint was impaired vision of five days' duration in the left eye. The fundus picture then seen was that of a low grade neuroretinitis with a few scattered macular exudates. At the age of six, following scarlet fever, a mild endocarditis and nephritis had developed. Sugar had been detected in the urine in 1919. When first seen in 1921 she had just commenced to menstruate, with a scant flow every two weeks, at which time she was nervous and complained of headaches. A recent refraction had found the eyes normal.

The physical examination was normal. All laboratory reports of the urine, blood, and spinal fluid were negative, as were the x-ray examinations of the sella turcica and sinuses.

The eye examination on April 16, 1921: vision right eye, 20/20; fields, media, and fundi normal; vision left eye, light perception. The left disc was edematous. The temporal side was more swollen, and from it ran several small vessels. The veins were slightly full and tortuous. The retina between the disc and macula was edematous. There was a complete macular star with central exudate. No hemorrhage was seen. By July the vision improved to 20/50; by September it was 20/20, with a normal retina.

The day before the menstruation in May she became blind in the right eye. The following day when the flow had begun, vision was restored. The attack was regarded as hysterical.

While it is admitted that headache and an unestablished menstruation is meager evidence upon which to base a diagnosis of endocrine imbalance, I venture the explanation that in certain of these cases toxic substances are produced which affect the vascular supply in the nerve head, adjacent choroid, or retina. This explanation is quite in keeping with the retinal hemorrhages frequently seen at the time of menstruation, at adolescence, or at the menopause.

Case 5: Bilateral papilledema, macular stars; suspected cerebellar tumor.

W. M. I., aged six years, complained of failing vision of ten days' duration, preceding which there had been attacks of vomiting and headache. A staggering gait and falling to the right were the only positive findings. The blood and spinal Wassermann tests were negative and the urine was normal. The x-ray picture of the skull showed nothing abnormal.

The eye examination revealed bilateral papilledema. The veins were full and tortuous; there were a few splotches of hemorrhage near the discs, and in the macular region were a few scattered exudates. Vision was light perception.

The day following a spinal drainage, which greatly relieved the headache and reduced the swelling of the discs, there appeared a shower of exudates in each macular region which assumed a stellate arrangement.

An operation was suggested, but the parents declined; when the patient was last seen the exudates were being slowly

absorbed and the disc was undergoing atrophy.

Case 6: Commotio retinæ, macular hemorrhage, incomplete macular star.

W. G., aged eleven years, was struck in the right eye with a rock. After one week, when the hemorrhage was absorbed from the anterior chamber and vitreous, there was seen a dark reddish area in the region of the fovea. The nasal side of the macula was slightly edematous, and it contained five or six rays of exudates. These exudates were finally absorbed, but vision was permanently impaired from the macular hemorrhage.

Pathology and mode of formation of the star. Since the macular star in nonrenal cases usually subsides and vision is restored, specimens for study are rare. Naturally, then, do we seek a comparative study from another source —namely, true albuminuric retinitis.

It is generally agreed that what are termed retinal exudates occur in the inner and outer nuclear layers with a gangliform degeneration of the nerve fibers. The serum escapes from the vessels, the plasma forms, and coagulation takes place with the formation of the white patches. It is debatable whether these patches are (1) dependent upon this coagulated albuminous plastic lymph, or (2) derived from the fat globules which result from the breaking down of the retinal elements or the degeneration of the products of inflammation and edema. It does seem that, if the patches are not rapidly absorbed, the fibrin contained therein contracts with age, and a degeneration takes place with the deposit of fat and crystals. Edema is an all-important part in the formation of these exudates, from which, Parsons thinks, they are entirely derived. Parsons further believes that cholesterin and other crystals form as a degenerative change late in the picture.

Verhoeff, examining the eyes from cases of brain tumor and nephritis (both containing edema and exudates), found little variation in the histopathology. Sclerotic changes were noted more frequently in the vessels of the renal cases, which explains the modified picture seen ophthalmoscopically—that is, the retina in renal cases is thus given less power to resist changes resulting from edema.

The formation of the macular star is a subject of controversy. Whether the exudates form along the radiating fibers in the outer nuclear and reticular layers, as advocated by Dimmer, or along the capillaries which penetrate to the outer reticular layer and converge toward the fovea, is a matter of personal interpretation. Weeks calls attention to the fact that the radiating cone fibers of Henle do not extend beyond the macula, whereas the stellate rays do go further.

Marcus Gunn explained the formation of these exudates by mechanical means. He argues that the macula, except at the fovea, is capable of unusual distention with fluid, for it is there that the retina is thicker than elsewhere and its interstices are wider. If the swelling or edema into the retina is slow in forming, the peripheral swelling would fade into the normal surrounding retina, but if sudden or if plastic in nature, then there would form a well-defined circular edge around the edematous area, like a fold or a crease.

When the macula is involved, the edema is arrested at the fovea, for there the outer cone segments are well attached to the pigment epithelium. This pegging down of the center of the loose swollen retina, which has taken place in all directions, will tend to produce fine folds radiating from the fovea. It is along these folds or creases that exudates form, augmented by the converging of the capillary vessels of the macula towards the fovea. These creases then determine the chief collection and coagulation of exudation and the degenerative processes in the retina, because where they exist the nutrition is lowered. This mechanism of causing the retina to crease has been compared to the drawing of a handkerchief through a ring.

In keeping with what has been said about the formation of deep macular exudates, one may mention the delicate

radiating lines or reflexes (seen best with brilliant or red-free illumination) which are located in the retina around the disc and especially in the macular region. These lines are interpreted by Von der Heydt as being folds in the external limiting membrane of the retina. This layer is frequently separated from the nerve fiber layer in cases of retinal edema induced by ocular concussion, exudative retinitis, thrombosis, or embolism, and as the edema subsides folds in this anterior retinal layer are first recognized. They finally disappear.

Discussion

From the foregoing it is seen that an edema of the retina (and often the choroid) is essential for the formation of the macular star. This edema may be fairly general as in a chorioretinitis of pregnancy with the formation of a complete star, or limited to a part of the macular region as in retinal thrombosis or commotio retinæ, forming an incomplete star.

During the period of greatest edema a few nonsymmetrical exudates may form in or near the macula, but as the swelling subsides other exudates rapidly appear. This would suggest that albuminous exudates do not coagulate, or at least degeneration does not take place in the presence of fluid.

If these exudates are dependent upon an edema, why then do they not occur in all cases of retinal edema? This may be explained by the variability in the interstitial structure of the retina, the various degrees of edema, the rapidity of its onset, and the causes. One naturally thinks of some toxic alteration of the blood, as in pregnancy retinitis, and it may play its part in the formation of the exudates, but the edema is the all-important factor.

The fact that the exudates are seen in the deeper layers of the retina has led me to believe that the choroid is as frequently and as severely involved as the retina. Statistics rather substantiate this statement, for the macular star formed in thirty percent of the cases of pregnancy chorioretinitis, and in only eight percent of the cases of brain tumor showing papilledema*.

It would seem, then, that damage to the chorioretinal elements and the formation of the macular star is not necessarily a direct consequence of a general disease, but of a local disturbance (edema) brought about by various conditions: (1) local, as in trauma; (2) remotely local, as in brain tumor; and (3) general, as in nephritis or chlorosis.

Of the various conditions in which the macular stars form, increased intracranial pressure is the most common. Nettleship observed its frequency in children, in which the increased intracranial pressure was due to congenital central lues. Likewise in connection with cerebral edema, Gibson reported finding the star in the eyes of several children suffering from plumbism.

The literature abounds in reports of cases, and attention to only a few important groups seems necessary: Thus from circulatory disturbances of the retina (thrombosis especially), Frost and Darmstadt mention the induced secondary changes in the retina similar to an "edematous effusion". Neubner reports two interesting cases of infection about the lid and temple with the formation of macular stars in the affected eye. An orbital infection with possibly an optic neuritis or a thrombosis must have existed, although they were not mentioned. Trauma to the skull and globe are also recorded by Leber and

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* In the series of 202 cases of brain tumor analyzed by Paton, "optic neuritis of a high type" occurred in 124 cases, and of a slight type in thirteen. Macular stars were observed in fifteen cases. Paton explained the picture by an overflow of the edematous fluid from the disc running under the external limiting membrane of the retina.

In Cushing's series of 200 cases of brain tumor, the star was observed eighteen times; a combined total (Paton and Cushing) of eight percent.

The changes in the choroid and retina incident to a toxemia of pregnancy may be in part induced by a cerebral edema, with its corresponding elevation in pressure. As to the frequency of the macular star in these cases, Schiøtz observed them twelve times in forty cases. A pathologically enlarged and shiny fovea was frequently seen and indicated a choroidal disturbance.

Hartridge, respectively. Retinal edema dependent upon anemia and chlorosis especially, with well formed stars, is frequently noted (Reese, Augstein, and Sallman, among others). Finally, there is a small group occurring in girls or young women, as in case four, in which no definite cause can at present be assigned.

131 Forrest avenue, northeast.

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A REVIEW OF THE LITERATURE ON THE ETIOLOGY OF ACUTE IRITIS

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CHICAGO

The more important contributions to the literature regarding the relation of focal infection to acute iritis are carefully reviewed. The sources of focal infection include the tonsils, the teeth, the accessory nasal sinuses, the intestinal tract, the posterior urethra and prostate, the seminal vesicles, and the pelvic organs; with less frequency the upper respiratory tract, the hilus of the lung, the gall bladder, the vermiform appendix, and the skin. From the department of ophthalmology, Northwestern University medical school, Chicago. Read, in the absence of the author, by Dr. H. S. Gradle, at the first annual meeting of the Association for Research in Ophthalmology, Detroit, June 24, 1930.

A discussion of the etiology of iritis has a significance now which it did not have twenty-five years ago. Then the treatment of most cases of iritis was more or less the same, regardless of etiology. Now the diagnosis of an iritis is only the beginning; most of our efforts must be directed to a determination of the etiology, since this should be the basis for the most effective treatment.

A glance into several standard textbooks shows that a modern viewpoint is reflected in only a few of them. Most European authors, especially German and French ones such as Heine (1921), Römer (1923), Krückmann (in Axenfeld's textbook, 1919), Ramsay (1920), and Poulard (1923) speak of syphilis, gonorrhea, gout and tuberculosis as the chief causes, and leave a remainder which they classify into a

rheumatic group. Fuchs (1924), de Schweinitz (1924), Ball (1927), and Parsons (1929) give proper importance to teeth, tonsils, and sinuses as foci of infection which are responsible for iritis.

Our clinical knowledge has been forced to wait upon the discoveries of the laboratory; it was not until Koch's discovery of tuberculin in 1890, the use of the Wassermann reaction in 1906, and the combined laboratory and clinical work of Billings[1] and Rosenow on focal infection, from 1909 to 1916, that we were properly equipped to deal with this problem of etiology.

E. V. L. Brown realized the importance of this work and, in collaboration with Irons, the internist, published in 1916 the first of a series of case reports in which all reliable laboratory and clinical procedures had been used to establish a correct etiological diagnosis. As a result of this and other reports which followed it, America was well in advance of Europe in recognizing the importance of focal infection as a cause of iritis and other forms of uveitis.

Even before the work of Brown and Irons, a few British ophthalmologists had begun to recognize the importance of foci of infection in iritis. Thus Butler, in 1911,[2] stated that iritis is frequently due to toxins absorbed from pyorrhea, sinus disease and probably from some other foci of suppuration such as chronic otorrhea. In a review of 100 cases he found twelve percent due to oral, nasal or other sepsis and six percent classed as rheumatic.

Lang,[3] in 1913, found 71 of 176 cases of eye diseases due to dental infection. He reported one case due to tonsillar infection and one to maxillary sinusitis, and stated that "these eye conditions are often septic in origin and not due to anemia, rheumatism or the gouty diathesis".

In 1913 de Schweinitz[4] made his classical report before the International Medical Congress in London. Although his subject was chronic uveitis, the results of his questionnaire, as answered by seventy-four ophthalmologists, give some idea of the state of opinion at that time; nine reported oral sepsis, six tonsils and twelve sinuses, as a cause of uveitis, while twenty-four considered gastrointestinal toxemia as a cause of iritis. De Schweinitz then and in later articles expressed his belief that the production of iritis by bacterial toxins alone had never been proven, and that bacteria themselves are present in the lesions.

I have collected in a table a number of clinical reports on iritis according to etiology. An estimate made by Arlt in 1853 is included for comparison with the more recent ones. The last series in the table was compiled from 118 cases of acute iritis, in our private patients seen during the past ten years, from the records of which enough data was obtained to justify a fairly probable etiological diagnosis.

In cases where more than one possible cause was present only that etiology was mentioned where complete relief of symptoms followed treatment of that supposed cause. The Wassermann test, dental, x-ray and rhinolaryngological examinations were made in practically all cases. The tuberculin test and urological or pelvic examinations were made in a fairly large number. Many cases were discarded because of insufficient data, and many more because the symptoms disappeared under general and local treatment without removal of supposed foci of infection.

It was worth while to go over these records, if only to bring out these facts with the realization of the probable imperfections of other series. One assumes that most of these cases, in which a supposed cause was not removed, will have recurrences, but this is not shown by our records.

Probably the most complete series is that reported at various times by Brown and Irons[5] since 1916. One of its advantages over most other series. is the report in 1926 on fifty previously reported cases that had been followed from three to twelve years. Forty-three of them remained free of recurrence, although twenty-three of that number had several attacks before the

supposed cause was treated. Of the seven who had recurrences, all had foci of infection which were not removed or causes which were not removable. Thus the cases with recurrence as well as those without seemed to bear out the etiological diagnosis determined in this group of cases.

In comparing these series, a fairly general agreement is noted for several causes. Syphilis was held responsible for seventeen to twenty-two percent in most series; the thirty-three percent of Bulson[7] is an exception. The gonococcus was accountable for three to six percent in nearly all series. The percentage of undetermined cases runs from the five and five-tenths percent of Elschnig to thirty-two and six-tenths percent in my series, except for Butler's forty-one percent, which he admitted probably included many due to dental sepsis, and Bulson's two percent, which probably should have included several cases with combined infection.

The great discrepancy between the series concerns the relative importance of focal infection and tuberculosis. If

CAUSES OF IRITIS

Author and date	Number of cases	% due to lues	% due to tuberculosis	% due to gonorrhea	% due to rheumatism	% due to tonsils	% due to teeth	% due to sinusitis	% due to intestinal toxaemia	% due to diabetes	% due to other causes	% due to undetermined causes
Arlt[10] 1853		17	36		21.5							25.5
Butler[2] 1911	100	22	6	6	6	12			4	1	2	41
Gilbert[9] 1929	500	16.6	45.6	3		1.2	1.2	4	—	—	—	17.4
Bulson[7] 1925	100	33		5		22	32	4			2	2
Elschnig[3] 1912		21	28		15.5		0		19			15.5
Elschnig[8] 1925	141	20	24.5	0	9		20 (includes rheumatism)		17.5			21
Irons and Brown[5] 1923	200	19	4	5		26.5	13.5	2			4.5	24 (20.5 combined infection, 3.5 no cause found)
Newton[6] 1925	75 (uveitis)	13.3	2.6	0		6.6	14.6	8	6.6		22.6	25.3
Gifford 1930	118	16.9	8.5	5.1 1.7 (prostatic and pelvic infection)		22	12.7	6.8		1.7		32.6 (8.5 combined infection, 16.1 no cause found)
Total	1234	19.8	17.2	2.8	5.8	9.3	11.1	2.3	5.2	.3	3.5	22.7

teeth, tonsils and sinuses are taken together as the chief sites of focal infection, it will be seen that these accounted for fifty-eight percent of Bulson's cases, while tuberculosis was not found once. In Brown and Irons' series focal infection accounted for forty-two percent of cases, and tuberculosis for only four percent, in some of which it was questionable. In my series the figure for focal infection is about the same, forty-one and five-tenths percent, with an additional eight and five-tenths percent where a choice between several foci could not be made, while only eight and five-tenths percent could be ascribed to tuberculosis.

In the European series in contrast to American series, Gilbert[9] found forty-five and six-tenths percent certainly due to tuberculosis and only two and eight-tenths percent to focal infections. Von Arlt[10] considered thirty-six percent tuberculous and twenty-one and five-tenths percent rheumatic. Elschnig in 1912 found twenty-eight percent of his series tuberculous and fifteen and five-tenths percent rheumatic, while in 1925, after special attention to dental sepsis, he found twenty-six percent due to this cause and twenty-four and five-tenths percent to tuberculosis.

In the discussion of Brown and Irons' report, Derby[11] called attention to the low incidence of tuberculosis in this series, and considered that almost sixteen percent of the cases were probably of tuberculous nature because they showed evidence of tuberculosis. Greenwood,[12] in the same discussion, brought out the difference in etiology between serous iritis and acute iritis; the former is more commonly due to tuberculosis, and explains the low incidence of tuberculosis in a series dealing with acute iritis. This distinction is probably an important one, as the European series undoubtedly contained some cases of serous iritis.

In these series it is often impossible to decide exactly what types of iritis were included and so to limit this report strictly to acute iritis, its proper subject. Another factor in explaining this difference in the reported causes of iritis is the fact that more cases in the American reports were seen in private practice, in which the incidence of tuberculosis might be expected to be lower than in the material of European clinics.

These facts hardly seem capable of explaining such marked differences; we are forced to conclude that too many cases are considered as tuberculous in some European clinics, and that the factor of focal infection is often neglected, while in this country focal infection has possibly received too much emphasis and many cases due to tuberculosis are not diagnosed as such.

Of the many papers on various causes of iritis, a large number are reports of relatively few personal cases and need not be mentioned here. Syphilis is recognized by most authors as a very frequent cause of iritis, especially of the acute variety. Igersheimer[13] found twenty-eight and nine-tenths percent of 154 cases of acute iritis due to syphilis, while in 86 cases of chronic iridocyclitis it was only responsible for eight and one-tenth percent. Since Groenouw calculated that three and two-tenths percent of all syphilitics have ocular involvement and almost half of these have uveitis, one may say that one and five-tenths percent of all syphilitic patients will have uveitis (Heine, 1921).

My table shows from thirteen and three-tenths percent to thirty-three percent of iritis reported by different observers as due to syphilis. Clapp[14] found a much higher figure, eighty-two and four-tenths percent of clinic cases and sixty-nine percent of private cases of acute iritis due to syphilis, but his material would seem to have been exceptional. Apparently the twenty-five percent accepted by Igersheimer as the probable incidence of iritis due to syphilis is consistent with the experience of most observers.

The experimental proof that iritis is caused by spirocheta pallida was offered by Igersheimer, who described the changes in three rabbits injected with cultures in the carotid artery.

While spirochetes were not found in the iris in his sections, he believes that syphilitic iritis is due to the presence of these organisms.

Brown and Pearce,[15] working with a large number of rabbits inoculated intratesticularly, found that iritis occurred commonly, and probably as often as keratitis. They describe the various forms observed, which coincide fairly well with human types of syphilitic iritis. In seventy-five percent of the animals showing ocular lesions, the lesions occurred as the terminal or only symptom except the primary lesion. Iritis usually occurred two to three months after inoculation, but in several it was delayed over a year. One animal had more than twelve attacks during two years, and recurrences were very common.

Similar experimental evidence with regard to the tubercle bacillus has been offered by Finnoff, and to him I am pleased to leave the whole discussion of tuberculosis and iritis.

Gonorrhea has caused about four percent of iritis in the series of most reporters. In Byers' monograph,[16] the most important work on the subject of gonococcal infection of the eye, some higher figures are given; fourteen percent reported by Collins and seventeen percent by Kipp. While gonococci are hard to demonstrate in the tissues, and could not be found in Byers' case, Sidler-Huguenin, quoted by de Schweinitz, did find them in the aqueous of a case.

It is almost certain that gonococci themselves are at some time present in the iris, as they are believed to be in the joints in gonorrheal arthritis. Byers found that while most cases occur either during or after joint involvement, ten of his 109 collected cases showed iritis prior to the joint involvement.

In most cases the iritis occurs as a complication of chronic posterior urethritis, with involvement of the prostate and seminal vesicles. While Byers does not give the incidence of prostatitis in his cases, the fact that the disease occurs chiefly in males (only five of his cases were females) is evidence of the importance of the prostate and seminal vesicles as foci of gonorrheal infection as compared with the female pelvic organs.

The latter is mentioned by most observers as a possible focus of infection in iritis, but few definite cases have been reported. In my present series only one case was thought to be of this nature.

Benedict and associates[17] have reported scleritis, but apparently not true iritis, as due to streptococcic pelvic infection in the female; relief was obtained with vaccines made of secretions from the cervix.

Thomasson[18] described the prostate as an organ in which like the tonsils pus exists under pressure, and which is a favorable site for absorption. He reported five cases of gonorrheal prostatitis with uveitis from the Knapp clinic; three had acute iridochoroiditis. All had been treated by removal of other more common foci of infection without result, but cleared up under treatment of the prostate. Zentmayer[19] reported three such cases, in one of which the iritis came on following massage of the prostate.

In Brown and Irons' series nine cases of gonorrheal, and six of nongonorrheal prostatitis occurred. Thomas[20] mentioned the importance of secondary organisms in producing metastatic complications after the gonorrheal infection has cleared up. Green[21] has seen a large number of cases of iritis due to prostatitis and seminal vesiculitis which were relieved by vasotomy and injection of silver protein into the vesicles.

Benedict's[17] cases, chiefly of scleritis, were nongonorrheal, and he stressed the fact that in many there were no symptoms and the urine was normal. With ten of eighteen strains of streptococci obtained after prostatic massage, and with four strains from the cervix, he and his associates were able to reproduce eye lesions in rabbits.

About thirty percent of animals so inoculated developed eye lesions, as opposed to one to seven percent of animals inoculated from other foci of

patients who had no eye lesions. In discussing his paper de Schweinitz expressed his opinion that the prostate is a frequent cause of uveitis.

A large literature has grown up on the relation of dental sepsis to iritis. It will not be necessary to review it all, because many reports such as those of Haskin,[22] Hartzell,[23] and Ulrich[24] merely record cases in which the clinical result of removing dental foci is used as evidence of the causal relationship. Ulrich gives some idea as to the relative frequency of iritis among the results of focal infection. Of his seventy-six patients in whom dental sepsis was a cause of disease elsewhere, seventeen had iritis.

Levy, Steinbugler and Pease[25] reported on fifty-seven patients sent from the Knapp hospital for removal of dental foci. Only seven had acute iritis, and of these one was cured, four were improved and two were not benefited. The percentage was about the same for the other ocular conditions making up the group. In all but one of the fifty-seven cases the dental sepsis was on the side of the ocular lesion, so that these authors believed infection must take place by the lymphatic channels and not by the blood-stream.

This was not true in fifty cases of iridocyclitis reported by Back[26] from the Elschnig clinic, as the dental pathology was in many instances found on the opposite side. Sixteen of these cases showed dental sepsis as the only apparent cause, while in thirty a combination of this with some other source of infection was present; the intestinal tract was apparently a factor in eleven.

Elschnig (1925) believes a toxemia is produced by the products of disintegrated bacteria and pus present in dental foci, and that this is often related in some way to the intestinal toxemia.

Woodson[27] called attention to the possibility of infected areas being left after the extraction of teeth, and reported several cases in which such areas were responsible for iritis. Benedict and Rosenow also emphasized this and pointed out the necessity of x-raying every case whether or not teeth are present.

In de Schweinitz' paper before the French ophthalmological society[28] the especially frequent association between dental infection with streptococcus viridans and iritis was brought out. Discussions by Fromaget, Dor, Polliot and van Lint showed their recognition of this relationship, although Fromaget considered it not so common as American observers seem to believe.

Fromaget went over the possible routes of infection and considered the question of elective localization of bacteria. In spite of his observation, and that of many others, that the dental and ocular lesions are most often homolateral, which would indicate an infection by continuity through the lymph channels, yet such an infection has never been demonstrated experimentally; it seems probable that Benedict and Rosenow are correct in assuming that bacteria usually reach the eye through the general circulation.

The experimental production of iritis has most often been performed with material from dental foci, since it is from these that it is easiest to obtain pure cultures. The most extensive work in this direction was done by Rosenow[29] and Benedict[30] and associates. In 1914 Rosenow observed acute iritis in two rabbits of thirty-five inoculated with streptococci from cases of acute rheumatic fever. In 1915 he reported that iritis occurred in nine animals after injection of streptococci from various sources.

Benedict used streptococci from fourteen cases of iritis, chiefly from dental foci, for intravenous injection in rabbits. Five of the fourteen were cases of acute iritis and material from four of them produced iritis in the rabbits, while cultures from none of the nine chronic cases produced ocular lesions. The organisms must be freshly isolated, and grown in Rosenow's deep cultures. Streptococci were isolated from the aqueous of these animals and also found in sections of the iris and ciliary body in this work and in that of Rosenow.

From these results Rosenow's theory of elective localization of streptococci was applied to eye lesions, it being assumed that the organisms find conditions of oxygen tension in the end-vessels of the iris and ciliary body similar to those in the original focus.

Other observers have attempted to repeat these experiments, but with varying success. Lewis[31] reproduced iritis with material from the tooth of one case, and grew streptococci from the experimentally infected eye. Haden,[32] who carried out Rosenow's technique with material from the teeth of fifteen cases of metastatic eye infection, produced ocular lesions in sixty-eight and two-tenths percent of sixty-six animals injected. Of 169 animals injected with streptococci from patients without eye lesions, only fourteen and eight-tenths percent developed ocular pathology. The usual lesion produced was an iritis, or an iridocyclitis, which yielded streptococci on culture.

The animals inoculated by Levy and associates[25] all died without showing ocular lesions. Back[26] injected fourteen animals with streptococci from cases of iridocyclitis, but none showed ocular lesions. The material used by Moody,[33] which produced only one and seven-tenths percent of ocular lesions, and by Henrici,[34] which produced none, was obtained from cases without eye lesions and hence the low incidence of eye lesions produced cannot be considered evidence against elective localization.

The material used by Irons, Brown and Nadler[5] was obtained from the lacrimal sac of a patient with dacryocystitis and iritis. Intravenous injections of the isolated streptococcus produced iritis in three of four rabbits. Later cultures from the same source gave similar results in two of four animals, from one of which a streptococcus was grown which produced iritis in another rabbit. The experimental iritis was an acute suppurative form.

A. L. Brown and Dummer[35] have recently produced ocular lesions in three rabbits injected in the carotid artery with a streptococcus from the antrum of a case of iritis. Later inoculations with the same material were negative, as were inoculations with a stock streptococcus and also with a streptococcus and pneumococcus from a corneal ulcer.

While inoculations in the carotid artery might be expected to give a high proportion of ocular lesions by means of direct bacterial emboli, this would hardly seem to offer as much evidence in favor of selective localization as injection into the general circulation by a vein.

To summarize the experimental evidence on the subject of elective localization, the results of Levy and associates and of Back were negative, while those of Rosenow, Benedict, Lewis, Irons Brown and Nadler, Haden, and A. L. Brown and Dummer were positive. So far as could be learned, no reports of positive inoculations with material obtained from the human eye itself have been made.

Absolute proof of the theory of elective localization would apparently demand such positive inoculations, since it can never be stated with certainty that an organism isolated from the teeth or tonsils is the one responsible for the original ocular involvement, and such proof would also demand the absence of lesions elsewhere in the experimental animals.

Practically, however, the preponderance of ocular lesions in the series of Benedict, Rosenow, and Haden does offer considerable evidence that streptococci from foci of infection of patients with iritis find conditions especially favorable to their growth in the eye.

This places the etiologic relationship of such foci of infection to iritis on a firmer basis than is true, for example, of intestinal disorders. The term intestinal toxemia, usually used to cover the results of such disorders, implies a somewhat vague conception of the processes involved.

I believe no one has ever reproduced iritis with organisms from the intestinal tract, nor has isolated any specific toxins which produce such lesions. Elschnig[8] assumed that indican in the

urine indicated intestinal toxemia, which he considered was the cause of uveitis in cases where no other cause was found.

De Schweinitz[4] pointed out that indicanuria is not sufficient evidence of intestinal toxemia and demanded a more thorough study of the patients' chemical processes. While twenty-four who answered his questionnaire believed that gastrointestinal toxemia was a cause of chronic ocular inflammation, only three submitted case reports. He believes there is no proof that toxins from the intestinal tract produce iritis, but thinks bacteria from the intestinal tract may do so.

Dwyer[36] reported on 122 cases of uveitis where the intestinal flora were studied; in a large number of them relief was produced by treatment which changed the nature of the flora. Mills'[37] report, that of eighty-eight cases of chronic uveitis eighty-seven showed intestinal parasites, has not been generally confirmed, so that ameba histolytica need not be considered an important cause of iritis, or at least not of the acute form.

With reference to the frequency of iritis from various foci of infection the clinical judgment of de Schweinitz[38] is worth recording. He considers the tonsils a more common source of iritis than the teeth; after these he lists the sinuses, intestinal tract, posterior urethra and prostate, seminal vesicles, and pelvic organs as more common foci, and the upper respiratory tract, hilus of the lung, gallbladder, appendix and skin as less common sources of infection.

Veasey[39] believes infected tonsils are the most common cause of iritis. Greenwood[12] has seen more cases arise from dental sepsis; he thinks tuberculosis is rarely responsible for acute iritis.

As a result of all this work of the past twenty years, it is evident that instead of having too few etiologic possibilities, we now have too many. In a large number of them proof has been offered of their etiologic relation to iritis in many cases; they must be considered and ruled out in any case.

A possible value of a survey such as this is that a view of the relative importance of various causes may be obtained. In cases where multiple causes are present, one may be guided by the law of probabilities in deciding which one to attack first.

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Discussion: CHAIRMAN PARKER: Does any member of the commission wish to ask Dr. Gradle any questions? It is understood that he is not responsible, but will answer as far as possible.

DR. LANCASTER: In the average case of iritis traceable to the prostate, is it the opinion that the gonococcus is the cause or is it a streptococcus that has come in as a secondary infection?

DR. GRADLE: We touch that here: "In Brown and Iron's series, nine cases of gonorrhea and six of nongonorrhea occurred. Thomas mentioned the importance of secondary organisms. Green does not state whether specific. Benedict's cases were chiefly nongonorrheal, with ten of eighteen strains of streptococci obtained after prostatic massage. De Schweinitz expressed the opinion that the prostate is a frequent source but did not state whether it was a specific gonorrheal prostatitis or a secondary infection of the prostate." As far as recent and current literature is concerned it would seem that secondary infection of the prostate rather than the original gonorrheal infection is the cause.

DR. WILDER: Did not Rosenow publish a report stating that he had recovered the organism from the eyes of rabbits, similar to that which he found in the focus of infection, and that he was able also by repeated inoculations to reproduce the disease?

DR. GRADLE: I think in one case he recovered the organism from the anterior chamber of the rabbit and with the organism thus recovered was able to produce ocular lesions in other rabbits.

DR. VERHOEFF: Is it not true that in this experimental work on iritis in rabbits, the vessels of the iris, choroid and orbit were found simply loaded with streptococci, a condition that no one ever finds in the human body under ordinary conditions? Do you think it fair under these conditions to consider these experiments of any importance whatever?

DR. GRADLE: That is not mentioned in the review of the literature; I am not able to answer that question from the paper Dr. Gifford gave me.

DR. ZENTMAYER: Is the diagnosis of gastrointestinal toxemia as a cause of acute iritis based on diagnosis by exclusion or upon direct evidence?

DR. GRADLE: According to the statements in this paper there is no direct evidence except the case reports. The only evidence is clinical. The experimental and laboratory evidence is not yet present.

DR. VERHOEFF: In all these reports no attempt, apparently, has been made to differentiate between different types of acute iritis. In this paper there did not seem to be a very clear differentiation between acute iritis and chronic iritis. They are very different and should be considered separately.

As regards acute iritis, it is possible in a great many cases to decide from

the clinical appearance of the eye the cause of the iritis. For instance, in syphilitic iritis I think that I can make a diagnosis in at least seventy-five per-cent of the cases without looking at anything but the eye.

The characteristic thing in my opinion is that there is a localized process, generally at the pupillary margins, which finally goes on and forms a nodule called a gumma or syphiloma. At the start it may be simply a localized congestion. The pupillary margin is stuck down at that point and the eye is not very much congested. There is very little pain at the onset, in contrast to ordinary iritis. If one will look in the mouth he will often find mucous patches.

There is a type of iritis that comes on very acutely with a great deal of pain, fibrinous exudate in the pupil, and a history of previous attacks which are shorter in duration than those of ordinary rheumatic iritis. When I see a case of this kind I immediately assume that it is due to gonorrheal infection, and in the majority of cases the evidence supports this diagnosis.

There are other cases very similar to this but of longer duration. These cases are in the doubtful category.

There is another type which begins very severely with much congestion and hypopyon. I do not know the cause of it but I do know that it will almost always subside rapidly under the use of atropin alone.

Is it not true that in all these statistics such clinical facts have been ignored?

In regard to treatment, we know that the ordinary acute iritis runs a course of about six weeks and then gets well. If the teeth are removed in the meantime can one say that this has helped in any way?

We do not have any statistics which show the recurrence in a series of cases of acute iritis that have not had focal infections attended to. Without such a control series, how can we draw conclusions in regard to the effect of removal of foci of infections upon recurrences of iritis?

DR. GRADLE: I think that question might have been eliminated had Dr. Verhoeff read the title of this paper, which is "Review of the literature on the etiology of acute iritis;" and it did not call for any expression of opinion or a differentiation of the various forms of iritis by Dr. Gifford. He was giving a review of the literature dealing with etiology. As regards the last point, if Dr. Verhoeff will look up the records of Drs. Brown and Irons' series of cases he will find that they deal rather extensively with the recurrences of cases in which the etiologic factor was found or was not found.

DR. GREENWOOD: This question is submitted by Dr. Borgeson: "Is it possible to get an acute iritis secondary to conjunctivitis?" I presume the question is whether the statistics of the literature show that possibility.

DR. GRADLE: In the literature I know of no case of acute iritis secondary to conjunctivitis.

DR. WILDER: I want to suggest that the last two questions that have been introduced could properly come up for consideration when Dr. Holloway reads his paper on "Evaluation of etiologic factors in acute iritis." It will delay the subject to enter into a discussion of them here.

CHAIRMAN PARKER: Dr. Wilder's suggestion is well taken. We will confine our questions to a review of the literature in acute iritis.

DR. ELLETT: I have here not a question but a statement from one of the authors who have been quoted in this paper, Dr. A. L. Brown: "Brown and Dummer's work was not to test the ability of the organisms in question to produce iritis, but the ability of the recovered organism to produce the immunologic effect of vaccine." Dr. Brown would like to explain that.

DR. A. L. BROWN: I want to explain the quotation that was given from Brown and Dummer's work on the etiology of experimental iritis. The organism that we recovered, from a patient with iritis from an infected tooth, was used in the carotid, not to see if it would produce iritis, but to

work along the lines of Rosenow in the specificity of the organism and the possibility of a change of virulence after reintroduction of the recovered organism. We tested vaccine from that organism to see whether local immunity could be produced. We realized that a shotgun dose of the organism in the carotid artery was most likely to produce iritis, but we were not trying to produce iritis. We were simply testing immunologic effects.

SYPHILITIC IRITIS

A study of 249 patients

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Statistical information here given is based upon 249 cases of syphilitic iritis occurring among over 10,000 syphilitic patients in the syphilis division of the Johns Hopkins Hospital medical clinic. In 111 cases the iritis was a part of the original secondary outbreak; in 29 the iritis was a recurrence phenomenon after inadequate treatment of early syphilis; and in the remaining 109 cases involvement of the iris was a late manifestation of the disease. The blood Wassermann test was positive in 97 percent of the early cases, in 55 percent of the cases of recurrence, and in 81 percent of the cases of late syphilitic iritis. The late type of iritis appears on an average nine years after the primary infection, and often exists for years before the diagnosis of syphilis is finally made. The systemic treatment of syphilitic iritis should be carried out in cooperation with the syphilologist. From the syphilis division of the medical clinic of the Johns Hopkins Hospital. Read before the Association for Research in Ophthalmology, June 24, 1930. (This investigation has been supported by a grant from the Committee on Research in Syphilis, Incorporated.)

The enormous literature on syphilitic iritis is summarized by Igersheimer in a recent publication[1] and in his book[2]. In the main, the literature deals with the subject from the point of view of the ophthalmologist. In this paper it is approached from the standpoint of the syphilologist, who sees ocular syphilis as one phenomenon of the generalized infection, rather than in its highly specialized ophthalmologic aspect. This view of the subject by a syphilologist has received little attention until the recent excellent publications of Zimmermann[3,4] and of Stokes[5]. A complete survey of the literature is provided by Igersheimer and Zimmermann. Reference only to especially pertinent studies will be made throughout the body of this paper.

The incidence of syphilis as a factor in the etiology of iritis: Estimates as to the frequency of syphilis as a cause of iritis vary widely, depending on the clientele investigated, whether private or clinic patients, white or black, and on the thoroughness of the study. The most careful investigation is that of Irons and Brown[6], who examined 200 patients with iritis from the medical standpoint (all white and many private patients), and found sixty-three among them with syphilis. In only thirty-eight of these, however, did the authors feel that syphilis could surely be designated as the etiologic factor. This estimate of nineteen percent is in contrast to that of Bruns[7], who found seventy percent positive Wassermann reactions among 202 cases of iritis, mostly in negroes.

I have made no attempt to estimate the incidence of syphilis among patients with iritis in the Wilmer Institute of the Johns Hopkins Hospital, regarding this question as of less importance than a careful study of a series of syphilitic patients with involvement of the iris. It is unwise, as will be pointed out, to assume that syphilis is or is not the etiologic factor in a given case on the basis of the blood Wassermann reaction alone; and it is a question of extraordinary difficulty to decide the non-syphilitic etiology of iritis in a known syphilitic patient.

The material of this study: From the records of the syphilis division of the Johns Hopkins Hospital, which include something more than 10,000 patients with syphilis, 249 cases of syphilitic iritis are available for study. From the standpoint of the duration of syphilitic infection they fall into three groups: 111 patients whose iritis was part of the original secondary outbreak; 29 who were admitted with early syphilis, were inadequately treated, recurred, and developed iritis as a recurrence phenomenon; and 109 patients with involvement of the iris as a late manifestation of the disease. The large majority of the patients were negroes. Analysis of this material has been undertaken from various points of view, and particularly emphasizes the facts that (1) iritis, and other ocular manifestations of the infection as well, must be studied as part of the whole disease picture, not as an isolated phenomenon removed from its setting; and (2) that iritis is only a part, and often only an insignificant one, of generalized syphilitic involvement of the eye.

The race and sex incidence of iritis among syphilitics: A recent study by Turner[8] of the race and sex incidence of various lesions of syphilis makes it possible to estimate accurately the influence which these factors have upon syphilitic iritis. The figures are shown in table 1. The approximate total number of individuals of each race and sex for each diagnostic subdivision of syphilis from which the material of this study is drawn is known (for example, in the group with early secondary syphilis there are 486 white males, 313 white females, 700 colored males, and 914 colored females), so that the percentage estimates of the incidence of iritis are fairly accurate. It appears that there is a definite racial predisposition toward iritis, the lesion, whether early or late, being slightly more than twice as common in negroes as in whites; furthermore, it may be said that iritis is definitely, but less strikingly, more prone to occur in males of either race than in females.

The expectancy of the development of iritis in association with the generalized secondary outbreak is 4.5 percent. It is generally thought to be more frequent as a part of early secondary syphilis than as a relapse phenomenon. The above figures, however, show that just the reverse is true; and indeed that, as a part of a relapse, it occurs twice as frequently as in the original outbreak. Also, contrary to the opinion of such observers as Igersheimer[1], iritis, usually complicated by other eye lesions, is a fairly common manifestation of late syphilis, and occurs more frequently than, for example,

Table 1

THE RACE AND SEX INCIDENCE OF SYPHILITIC IRITIS AMONG 10,000 SYPHILITIC PATIENTS
(Modified after Turner)

Type of syphilis	Total cases	Total cases with iritis and complications	Per cent, by race and sex, of patients with iritis based on total numbers of each race and sex in diagnostic group			
			White 1.4 per cent		Colored 3.3 per cent	
			Male	Female	Male	Female
Early secondary	2413	111 (4.5%)	1.6	1.6	8.0	4.5
Recurrent secondary	309	29 (9.3%)	7.5	2.5	14.1	9.7
Late	3420	109 (3.1%)	0.9	1.4	2.4	1.6

Total males 3.1 per cent.
Total females 2.3 per cent

syphilitic lesions of the viscera (other than the cardiovascular apparatus).

The evidence on which a diagnosis of syphilis may be based in patients with iritis: Since, from the ophthalmologic standpoint, syphilitic iritis cannot be differentiated from iritis due to some other cause (except in the case of iritis papulosa), the proof of its specific etiology must rest on a study of the patient as a whole. It is reasonable to assume that iritis in a patient with a proved syphilitic infection is due to syphilis, provided that other possible etiologic factors such as focal infection, gonorrhea, and tuberculosis can be excluded; or even if such factors are present, the presumption of the syphilitic etiology of the iritis is strong provided it is accompanied by other lesions of syphilis, or provided it heals promptly on the institution of antisyphilitic treatment.

An examination for syphilis must, however, include more than the customary blood Wassermann test. The proof of the presence of syphilitic infection rests on a number of factors which must be intimately correlated. A history of syphilis is of value when clear-cut, but its absence means nothing. In the early and relapsing groups of syphilitic iritis a positive history is readily obtainable; in considering patients with late lesions of syphilis, whether iritis or some other lesion, it cannot be too frequently emphasized that the absence of a story of infection is of absolutely no significance. For example, of the 109 patients with late syphilis in this series, a history of infection was obtainable, even with questioning in the vernacular (which is important especially in negroes), in only forty-three cases or thirty-nine percent. Sixty-three percent of the males, but only seventeen percent of the females, were able to recall earlier lesions which were presumably syphilitic.

Complete physical examination is much more important than the history. Of 111 patients with early syphilis, other lesions, usually mucocutaneous, were easily demonstrable in all but five, and even in these there was the scar of a recently healed chancre. On the other hand, iritis is much more prone to occur as an isolated phenomenon of relapse, since in twenty of twenty-nine patients, or sixty-eight percent, of this group, no other evidence of early syphilis could be found; although in all there was a clear history of a recent infection inadequately treated.

Most interest attaches to late syphilis where in no less than fifty-five cases, or fifty percent, late lesions of syphilis other than iritis were present. In the remaining fifty-four cases the evidence for the existence of syphilis was as follows:

History positive, blood Wassermann test positive	13
History negative, blood Wassermann test positive	33
History positive, blood Wassermann test negative	5
History negative, blood Wassermann test and cerebrospinal fluid Wassermann test negative	3

There are then only three patients of the 109 in whom definite corroborative evidence of the presence of syphilis, other than a positive therapeutic test, could not be found.

As appears from table 2, the blood Wassermann test is most valuable as a diagnostic aid in early iritis, where it was positive in ninety-seven percent of the cases; and of least value in iridorecurrence, where only fifty-five percent positive tests were obtained. Here, however, the easily obtainable history and the usually rapid therapeutic response make the diagnosis. In late iritides the incidence of positive blood Wassermann reactions is eighty-one percent, about that for late syphilis in general. In the twenty instances in which the blood Wassermann test was negative a clear history of early syphilis was obtainable in five cases; other definite late lesions, usually neurosyphilis or cardiovascular syphilis, were present in twelve cases. An attempt to determine the incidence of syphilis as an etiologic factor in iritis by means of the blood Wassermann test, therefore, will reveal practically

all instances of early iritis, but will miss at least twenty-five percent of cases of early relapsing iritis and late iritis.

The spinal fluid findings taken by themselves are of little aid from a diagnostic standpoint, since there was no case in this series in which a positive spinal fluid was the only corroborative evidence of syphilis. The findings are presented here as contributory data to the perennial argument that neurosyphilis is or is not a frequent concomitant finding in cases of iritis. Zimmermann[3] reviews the literature on this point and reports sixty-one cases of his own with spinal fluid studies. His findings are borne out by ours, the conclusion being that the incidence of positive spinal fluids in iritis, early or late, is no higher than in early or late syphilis generally. The only exception to this statement is the small group of patients with iritis as a relapse phenomenon, which will be commented on in more detail presently.

Other lesions of syphilis associated with syphilitic iritis: These data are presented in table 3 and show a number of interesting, and a few inexplicable, facts. In the column headed "early" are shown the lesions of early syphilis concomitant with iritis. A generalized skin rash was present in seventy-five percent of the patients, and it is striking that the most frequent type observed was the group with a folliculopapular rash. All but one of the thirty-five instances of this type of skin lesion occurred in negroes. Forty-six percent of all the early cutaneous syphilides in negroes with iritis were of the folliculopapular type. While this variety of early skin lesion is peculiarly common in negroes and comparatively rare in whites it is much more frequent in association with iritis than without it.

Zimmermann[9] has presented figures to show that in early secondary syphilis in general, regardless of the presence or absence of iritis, this type of rash is observed in twenty-seven percent of negroes. He has pointed out elsewhere[3], as we have also observed, a common clinical syndrome in the negro, consisting of a profuse folliculopapular syphilide, definite syphilitic arthritis (usually of the ankles), marked polyadenitis, and iridocyclitis. There were nine instances of arthritis or periostitis observed in this series, all of which occurred in negroes, and seven of these showed this particular symptom complex. The eight percent incidence of osseous complications in this series of patients with iritis is almost four times as great as that of bone lesions in colored patients with early secondary syphilis as a whole (Turner[8]); this fact must be statistically significant. These associations of syphilitic iritis with the folliculopapular syphilide and with arthritis cannot be mere coincidence, though at present their significance must remain speculative, or based upon vague statements as to human constitution or racial predisposition to disease.

Table 2

THE BLOOD WASSERMANN AND SPINAL FLUID FINDINGS IN SYPHILITIC IRITIS

Type of iritis	Blood Wassermann test				Cerebrospinal fluid Wassermann test		
	Total cases	Positive	Doubtful	Negative	Total cases	Positive	Negative
Early	110	106	1	3	43	9	34
		97%				20%	
Relapsing	27	15		12	17	7	10
		55%				41%	
Late	108	86	2	20	44	12	32
		81%				26%	

There are no other important conclusions to be drawn as to race or sex, or as to the association of other lesions with early syphilitic iritis; but it is worth pointing out that, excluding the patients with generalized skin lesions, in no less than twenty-six of 111 patients the concomitant physical evidence of syphilis consisted of insignificant lesions discoverable only by examination of the stripped patient, and often apparent only to the trained observer. The extent to which the less obvious lesions of early syphilis may be overlooked or misinterpreted is well illustrated by the following case record:

A low index of suspicion in early ocular syphilis: U 29085, white female, aged forty-one years, admitted January 2, 1930. History: July, 1929, genital itching and irritation, diagnosed diabetes by outside physician. Diet. No improvement. November, 1929, eyes inflamed, vision blurred. Ophthalmologist advises extraction of all teeth. No improvement. November, 1929, hair of head, of axillæ, and of pubes fell out.

January 2, 1930, light perception only. On admission, search for foci of infection started.

January 4, 1930, tonsillectomy. No improvement in eyes.

January 10, 1930, blood Wassermann test reported positive. Syphilologic consultation.

Evidence of syphilis: January 10, 1930, extensive generalized alopecia, crusted papules in hair margin, genital scars and fresh erosions, right iritis, bilateral neuroretinitis.

Diagnosis: secondary syphilis.

Treatment: two courses of arsphenamin, one of bismuth.

Result: Normal vision in three months.

Two facts of great interest appear from a study of the lesions associated with relapsing iritis. It is usually, as has already been indicated, a monorecurrence (twenty cases of twenty-nine), and frequently the blood Wassermann is negative; the diagnosis is, therefore, likely to be missed by the ophthalmologist who fails to question his patient carefully for a history of syphilis. Much more important, however, are (1) the association in four patients of iritis as a relapse phenomenon with an outspoken neurorecurrence, and (2) the fact that in three others the iritis was immediately preceded (one case) or followed (two cases) by a neurorecurrence. Zimmermann[3] noted this same association in two of fifteen cases observed by him. Combining Zimmermann's figures with these, this gives an incidence of neurorecurrence

Table 3

OTHER LESIONS OF SYPHILIS ASSOCIATED WITH SYPHILITIC IRITIS

Associated lesions of early syphilis		Early and relapsing		Associated lesions of late syphilis	Late
		Early	Relapsing		
None		5	20	None	54
General lymph node enlargement		5		Neurosyphilis	13
Type of Secondary eruption	Macular	5		Cardiovascular	16
	Maculopapular	21		Tertiary bone	14
	Annulopapular	4	1	Tertiary skin or mucosal	12
	Folliculopapular	35		Tertiary gland	1
	Large flat papular	10		Scars	6
	Papulopustular	6		Pigmentary	1
	Pustular	1	1		
	Malignant	1	1		
Mucous lesions only		9	2		
Pigmentary skin lesions		3			
Arthritis or periostitis		9			
Alopecia		5	1		
Neurosyphilis (meningeal)		1	4*		

* In 3 additional cases, the iritis was shortly preceded or followed by a relapse of the neurorecurrence type.

associated with relapsing iritis of twenty percent, whereas the normal expectancy of neurorecurrence as a complication of relapsing mucocutaneous secondary syphilis is only five percent (Moore and Kemp[10]). The occurrence of these seven instances of neurorecurrence is the sole factor accounting for the almost doubled incidence of positive spinal fluids in the group of patients with relapsing, as compared with early or late, iritides (table 2).

This association also can hardly be mere coincidence. This association can also be correlated with the facts that iritis is twice as frequent a manifestation of recurrent syphilis as of early secondary syphilis, that it usually occurs as a unilateral monorecurrence unaccompanied by generalized manifestations of recurrent secondary syphilis, and that at the time of the relapse the blood Wassermann test is usually negative. It is suggested that the eye, like the nervous system, is invaded by the treponeme at the time of generalization of the virus more frequently than the incidence of obvious lesions would lead one to expect. In many instances, the presence of the organism must fail to call forth the usual inflammatory tissue response. This may be due to the fact that the inauguration of treatment for early syphilis prevents the development of an actual inflammatory reaction, or it may be due to an immune reaction called forth in the tissues of the eye by the treponeme. That the first of these hypotheses is at least sometimes the case is further suggested by the relative frequency with which the first injection of arsphenamin may actually precipitate an iritis in a previously uninvolved eye (Jarisch-Herxheimer reaction).

Iridorecurrence, therefore, would appear to depend not on a fresh generalization of organisms with fresh invasion of a previously noninvaded eye but rather, as Zimmermann[3] has already pointed out, on the same mechanism as neurorecurrence: that substerilizing treatment with arsphenamin may destroy all or most of the treponemes except those in the nervous system or eye. This sudden destruction of organisms by treatment prevents the tissue response and immune reactions called forth by the development of lesions and their spontaneous healing which occurs in untreated patients with early syphilis. The foci of organisms remaining in the nervous system or the eye are therefore at liberty to multiply as if they had been freshly introduced from without, and after an appropriate incubation period the inflammatory reaction has progressed to the point of causing the iridorecurrence or neurorecurrence (Moore[11]).

The high incidence of manifest lesions of late syphilis (fifty percent) associated with involvement of the iris, as shown in table 3, is in marked contrast to the statements of Igersheimer[2] and Zimmermann[3] that late iritis is usually an isolated phenomenon of the disease. No tendency to the association of particular lesions with iritis is apparent, and no conclusions can be drawn as to race or sex susceptibility to particular symptom complexes, as in early and relapsing iritis. The main points to be made from this association of late syphilitic lesions with iritis are that complete physical examination is essential not only in arriving at a correct diagnosis but also in treatment. The ophthalmologist who attempts the treatment of the late ocular manifestations of syphilis without syphilologic consultation is courting therapeutic disaster.

Ocular lesions associated with syphilitic iritis: Table 4 indicates clearly that syphilitic iritis is only one manifestation of much more widespread involvement of the tissues of the eye by the treponeme. In early syphilis, half the cases are uncomplicated from the ophthalmologic standpoint, but in relapsing syphilis only one third and in late syphilis one fourth of the cases are free from other lesions, most of which are potentially more threatening to vision than iritis. Keratoiritis is of course the commonest complication at any stage of the infection, and in early syphilis it is more frequent proportionately in negroes than whites (eighteen

percent as compared to eight percent). No other significant race or sex differences are apparent. Iritis papulosa (so called condyloma or gumma of the iris) is relatively infrequent both in early and late syphilis.

Special features of iritis as part of early syphilis: In eighty-one cases in which the approximate duration of infection was known, iritis appeared within the first four and one-half months. In twenty-nine instances it was the earliest manifestation after the chancre to appear, antedating the more generalized outbreak by one to fourteen days. The eye involvement was bilateral in fifty cases, unilateral in sixty-one cases. It has been frequently observed in the literature (Igersheimer[3]) that iritis tends to be a part of an unusually severe secondary outbreak; that concomitant secondary mucocutaneous lesions are more profuse and more likely to be papular, pustular, or malignant than in patients without iritis. While it is true that in the material of this series there were a number of patients (thirty) whose mucocutaneous lesions seemed unusually severe or intense (more frequent in negroes than in whites), the reverse was also true. There were thirty-five patients whose mucocutaneous lesions were so trivial or insignificant as often to have escaped the patient's notice. The proportion of mild, moderately severe, and severe secondary phenomena seems about the same as in a series of patients with secondary syphilis without iritis.

The tendency of iritis to relapse repeatedly is not so marked as in other types of ocular lesions, notably neuroretinitis and chorioretinitis. Of forty-eight patients in this series of early iritides observed for one year or longer, four suffered from a subsequent relapse involving the eyes; thirty-eight did not. Three of the 111 patients, however, developed a neurorecurrence as a relapse following the iritis. This brings the total number of cases of observed association of iritis and neurorecurrence to ten, and adds weight to the discussion already given of the relationship of iridorecurrence and neurorecurrence.

Special features of iritis as a relapse phenomenon: The average interval between the appearance of the relapse and the last treatment (always of inadequate amount and averaging only 6 plus doses of arsphenamin) given for the

Table 4

OTHER OCULAR LESIONS ASSOCIATED WITH SYPHILITIC IRITIS

Associated other eye lesions		Type of iritis		
		As early lesion	As relapsing secondary lesion	As late lesion
Total cases	249	111	29	109
None; uncomplicated	89	55	10	24
Keratoiritis	79	19	10	50
Neuroretinitis	27	17	6	4
Iridocyclitis	18	13		5
Iritis papulosa	16	6	3	7
Interstitial keratitis	14			14
Lenticular opacities	8			5
Choroiditis or chorioretinitis	8	3		5
Corneal ulcers	5			5
Hypopyon	5	2	3	
Optic atrophy (postneuritic)	5			5
Perforated cornea	2			2
Detached retina	2			2
Keratitis profunda	1			1
Episcleritis	1			1
Ruptured iris	1		1	
Panophthalmitis	1		1	

original primary or secondary manifestations was six months. This is artificially high because of the inclusion of four cases in which the interval was more than one year (in one case four and one-half years). Twenty-one patients relapsed within the first four months after the cessation of treatment.

Ten of the twenty-nine patients in this group were chronic relapsers in that they suffered from relapses other than iritis previously or subsequently. There is no indication of a tendency to repeated relapse, so far as iritis is concerned, in an eye involved by syphilis, since in only four instances did the original secondary outbreak include an iritis which was then followed by an iridorecurrence; and in only one patient with iritis as a relapse phenomenon was there subsequent relapse involving the eye.

The frequency of iritis as a monorecurrence and in association with neurorecurrence has already been pointed out. In only five of twenty-nine instances was iridorecurrence accompanied by a simultaneous mucocutaneous relapse.

As a general rule, there was no tendency, as Zimmermann[3] suggests, for relapsing iritis to be more serious or fulminating than early iritis. Both eyes were involved in only five cases, the iritis being unilateral in the remainder. An effort was made to estimate clinically the severity of the eye involvement in the early and relapsing groups on a scale of zero to four; in each group, about half could be classified as mild to moderately severe, and about half as severe. That relapsing ocular syphilis can be of fulminating onset and of devastating severity is, however, well shown by the following case record:

The potential gravity of ocular relapse: G 22269, colored male, aged twenty-four years, admitted May 16, 1925; diagnosis, seropositive primary syphilis. Treatment May 19, 1925 to June 9, 1925, arsphenamin four injections. Lapse of four weeks. July 7, 1925, acute onset of inflammation in eyes; blind within three days.

July 14, 1925, bilateral acute iritis, vitreous opacities, neuroretinitis, chorioretinitis, retinal hemorrhages, possibly detached retina, thrombosis of retinal vessels. Wassermann tests on blood and cerebrospinal fluid negative. Treatment for three years: forty-three arsphenamin, forty-seven bismuth injections. No improvement in eyes. April 2, 1929, phthisis bulbi left eye; lenticular opacities right eye; bilateral blindness.

Special features of iritis in late syphilis: In table 5 appear the details of the duration of infection at the time of appearance of the iritis; this averaged 9.7 years. More important, there is shown the duration of the eye lesion at the time of admission to the syphilis division. This represents in most instances the first time that syphilis had been diagnosed. Seventy-one of the 109 patients in this group had never been previously diagnosed as syphilitic or treated for syphilis; fifteen had had some previous antisyphilitic treatment given before the appearance of the eye lesion; and in only nineteen, or seventeen percent, had any previous treatment, other than local, been given for the eye lesion. Generally speaking, the forty-four patients whose iritis, complicated or uncomplicated, had been present for less than three months, reported to the Johns Hopkins Hospital for their first medical advice regarding the iritis; the remaining fifty-six had consulted many physicians in private practice or in special clinics or hospitals, and most of them had never undergone even so elementary an investigation for syphilis as a blood Wassermann test.

In thirty-four patients the eye lesion had been present for more than one year before the diagnosis of syphilis was made and treatment started; and no less than nine individuals had had a low grade chronic iritis or keratoiritis, first appearing several years after infection with syphilis, for more than ten years. This seems to indicate an extremely low index of suspicion for syphilis, and a tendency to think of it as a diagnostic possibility last instead of first. To what extent this is produc-

tive of poor therapeutic results will be pointed out in the discussion as to the ultimate outcome of iritides in general. The syphilologist is of course open to the accusation of bias, of possessing a jaundiced eye which sees syphilis in everything; and to some extent this criticism may be justified. His attitude however is only that, when confronted with a lesion which is often or only even sometimes caused by syphilis, and particularly when that lesion may produce such serious and irreparable damage as blindness, the patient is entitled to at least the minimum of a general physical survey and a blood Wassermann test before he is denuded of his teeth, tonsils, appendix, gall bladder, or other possible foci of infection. Only too often, even in the best of ophthalmologic clinics, is syphilis given consideration as a possible diagnosis after, and not before, more elaborate investigations or treatment procedures have failed to heal the eye lesion.

In the groups of early and relapsing iritis there can hardly be any doubt that the eye lesion was due to syphilis. It is in the late group that confusion may arise over the question of syphilitic iritis versus iritis due to some other etiologic factor in a syphilitic patient. It is obvious of course that syphilitic individuals are subject to all the diseases to which more fortunate mankind is heir. On the basis of statistical probability, Zimmermann[3] estimates that one may expect the association of a nonsyphilitic iritis with syphilis in six to seven of every hundred supposed syphilitic iritides. The only differential diagnostic measure which seems to be even partly reliable is a therapeutic test; and even this is difficult to interpret because of the facts that certain syphilitic eye lesions involving the cornea are notoriously difficult to influence as rapidly as syphilitic lesions elsewhere; and that the arsphenamin products exercise a marked nonspecific effect on nonsyphilitic iritides, whether tuberculous or due to focal infection. I have records of fourteen such patients (not included in this series), in whom the most exhaustive search failed to reveal any evidence of syphilis; other methods of treatment including tuberculin, non-specific protein, and extirpation of all conceivable foci of infection had failed to produce amelioration of the eye lesions; as a last resort, arsphenamin was given. In every instance, provided arsphenamin treatment was sufficiently prolonged, there was definite improvement, and in eight patients there was a complete and permanent cure.

In this series of 109 patients there were two in whom the eye lesion healed after tuberculin therapy, when arsphenamin had failed to produce any result. In several others response to antisyphilitic treatment seemed unusually slow but finally occurred. In twenty patients there were repeated flareups or relapses in the involved eyes, sometimes actually during treatment, but more usually

Table 5

LATE SYPHILITIC IRITIS: DURATION OF SYPHILIS AT ADMISSION, AND DURATION OF EYE LESION

Duration of syphilitic infection

Total	No history or no accurate data	0 to 2 yrs.	3 to 5 yrs.	6 to 10 yrs.	11 to 15 yrs.	16 to 20 yrs.	20 plus yrs.
109	67	8	12	5	5	9	3

Average duration of infection, 9.7 years.

Duration of eye lesion before syphilis was diagnosed

Total cases	Less than 1 mo.	1 to 3 mos.	4 to 6 mos.	7 to 9 mos.	9 to 12 mos.	1 to 3 yrs.	2 to 3 yrs.	4 to 5 yrs.	6 to 10 yrs.	10 plus yrs.
100	26	18	11	5	6	10	5	4	6	9

Average duration of eye lesion before diagnosis, 2.0 years plus.

months or years after treatment had stopped. The tendency to repeated relapse is much greater in this group than in the others, and may perhaps be an indication of a nonsyphilitic cause for the iritis, or the iritis may be an allergic manifestation due to intoxication of the sensitized ocular structures from a remote syphilitic focus.

Secondary glaucoma as a complication of syphilitic iritis: Secondary glaucoma is an uncommon complication of either early or recurrent iritis, since it was observed only twice in the 111 early cases and not at all in the twenty-nine recurrences. The early cases also tend to be milder and more amenable to medical (rather than surgical) treatment in early than in late iritides. In contrast with this, 14 of 109 patients with late iritis developed secondary glaucoma as a complication, and in almost every instance permanent visual damage resulted.

The incidence of trauma as an exciting cause of syphilitic iritis: This is a debatable point in the literature, and the material of this study does little to settle the question. A clear history of trauma immediately antecedent to the appearance of the ocular lesion was obtained in four cases, or 3.6 percent of the early group; one case, or 3.5 percent, of the relapsers; and nine cases, or 8.2 percent, of the late group. The increased incidence in the latter may well mean that certain of the cases regarded as syphilitic were actually traumatic, though there is no clear proof available.

Puscariu[12] reports that of 443 patients subjected to cataract extraction, fifteen developed a postoperative plastic iritis, and of these syphilis was demonstrable in nine. Ophthalmologists generally hesitate to adopt operative procedures on the eye of a syphilitic patient, whether ocular lesions of syphilis are or are not present, for fear of the appearance of syphilitic lesions or the exacerbation of those already present. In order to study this point further, the records of the Wilmer Institute were examined; thirty-three patients were found in whom operations were performed in the presence of a preexisting syphilis, most frequently for glaucoma resulting from an old syphilitic uveitis. In only one instance was there an untoward result so far as syphilis was concerned, and this was true whether or not there had been any previous antisyphilitic treatment. In this one case a mild iritis developed and healed spontaneously following a trephine operation for glaucoma.

In general, one may say that the ophthalmologist's attitude toward surgical interference in the eye of a patient with syphilis should be that of the general surgeon toward operations elsewhere in the body (Keidel[13]), namely, that a positive blood Wassermann reaction is not a contraindication to operation. If the situation is a surgical emergency immediate operation is permissible, to be followed immediately by energetic antisyphilitic treatment. If the operation is one of election it is advisable to give a course of treatment

Table 6

THE ULTIMATE OUTCOME OF THE EYE LESION IN SYPHILITIC IRITIS

Group	Total cases	No data	Blind	Poor (less than useful vision in one or both eyes)	Fair (moderate visual impairment one or both eyes)	Good (practically no residuals producing visual damage)
Early syphilis	111	22	—	9	2	78
Recurrent syphilis	29	7	2	3	—	17
Late syphilis	109	30	10	17	6	46*
Total	249	59	12	29	8	141

* In one case, opposite eye previously enucleated elsewhere for syphilitic keratoiritis.

(four to eight weeks) prior to operation and to continue it as promptly as possible afterward. It is never necessary to "wait until the Wassermann is negative". This may never happen and the patient may thus be deprived of a vision-saving procedure.

The specific treatment of syphilitic iritis and its ultimate outcome. Publications by Zimmermann[4], Stokes[5], and Chambers[14] have familiarized ophthalmologists with present day treatment methods and have gone far to dispel the earlier fears of the deleterious effects of the arsphenamins on the eye. One need only emphasize that the specific treatment of syphilitic iritis is that of syphilis in general: it should not be undertaken without thorough knowledge of the patient as a whole, and of the range of therapeutic possibilities and dangers of the drugs employed. From the standpoint of syphilis as an infection it is worse than useless and actually dangerous to treat the patient with early or relapsing iritis only until the eye is well or until the blood Wassermann reaction is negative. The ophthalmologist is often surprised at the syphilologist's insistence on prolongation of treatment long after the patient is asymptomatic and serologically negative. This is because the syphilologist sees relapse or progression vastly more frequently elsewhere in the body than in the eye, and because he is aware of its disastrous possibilities for familial transmission, ill health, and death. The optimum amount of treatment for early syphilis, with or without iritis, is one year of continuous treatment without rest periods of any kind, after the Wassermann tests on the blood and spinal fluid have become and have remained completely negative[15].

The treatment of late syphilis with iritis is so complicated by its possible association with syphilitic lesions elsewhere in the body, that the ophthalmologist is unwise to attempt it without specialized advice.

The ultimate outcome of the eye lesions in the present series of cases is summarized in table 6. At any stage of the disease, syphilitic iritis and its ocular complications are potentially dangerous to vision. This danger is least in patients with early secondary syphilis where the ultimate outcome as to vision is known to be excellent in seventy percent of the patients. The danger to vision grows progressively greater in the recurrence group (fifty-eight percent good results); two patients in this group that we studied are permanently blind, and three are left with less than useful vision. In the late iritides, good results were obtained in only forty-two percent; ten patients are blind and in seventeen there is marked permanent residual damage, a total of twenty-four percent disastrous results. It is only fair to say that in nine of these twenty-seven patients the poor result is at least partly attributable to neglect, since the end result represents their condition on admission to the clinic after several years of wandering from hospital to hospital undiagnosed, or after insufficient and ineffectual treatment given elsewhere. Also it need hardly be pointed out that permanent visual damage is due not to the iritis but to its complications, such as keratitis with residual corneal opacities, neuroretinitis, or chorioretinitis, or to its sequela, secondary glaucoma. The increased incidence of poor results in late as compared to early or relapsing iritis is partly due to the increased incidence of these complications in the late group. It is nevertheless true that even in late syphilitic iritis, including all its complications, early diagnosis and the prompt institution of adequate treatment will save many patients from near or complete blindness.

Summary

1. This paper is based on 249 patients with syphilitic iritis, of whom 111 had early secondary syphilis, twenty-nine had recurrent secondary syphilis, and 109 had late syphilis.

2. Whether early or late, iritis is twice as common in colored patients as in white patients with syphilis, and slightly more frequent in males than in females.

3. Iritis may be expected to occur in from four to five percent of all patients with early secondary syphilis. It is almost twice as frequent as a manifestation of a recurrent secondary syphilis, and is a fairly common manifestation of late syphilis.

4. The diagnosis of syphilitic iritis depends upon the examination of the patient as a whole. In arriving at a diagnosis a history of syphilis is important in early and recurrent iritis but not in late iritis; complete physical survey is necessary to determine the presence or absence of associated syphilitic lesions.

5. The blood Wassermann test is positive in ninety-seven percent of the early cases of iritis, but in only fifty-five percent of the cases of recurrence and eighty-one percent of the cases with late syphilitic iritis.

6. Spinal fluid findings in 104 patients with iritis indicate that, taken alone, lumbar puncture is of little diagnostic aid. They do show, however, that asymptomatic neurosyphilis is no more frequent in patients with iritis, whether early or late, than without it.

7. In early syphilitic iritis, associated lesions of early syphilis may be found in practically every case. Seventy-five percent of the patients had generalized eruptions. In about one-fourth of the patients, however, the associated lesions were so insignificant as to be easily overlooked.

8. In negroes with early syphilitic iritis, the most commonly observed rash was in the group with the folliculopapular syphilide, often in association with marked polyadenitis and syphilitic arthritis.

9. Iritis as a manifestation of recurrent secondary syphilis is usually a monorecurrence and unilateral, the blood Wassermann being negative. In seven of twenty-nine cases it was observed to be associated with a neurorecurrence.

10. These facts suggest an explanation for the probable mechanism of iridorecurrence, which may be similar to that of neurorecurrence.

11. In late syphilitic iritis other manifestations of syphilis could be found in fifty percent of the patients.

12. Iritis is often complicated by other ocular lesions of syphilis (early cases one-half, recurrent cases two-thirds, late cases three-fourths) which are potentially more threatening to vision than iritis. Keratoiritis is the commonest complication.

13. Iritis is often an early manifestation of secondary syphilis. In this series there was no tendency for it to be associated with an unusually severe secondary outbreak.

14. Early iritis shows no special tendency to subsequent relapse.

15. Recurrent iritis usually appears within the first four months after the inadequate treatment of early syphilis. It may be, but usually is not, more serious or fulminating than early iritis.

16. Late iritis appears on an average nine years after infection. It often exists for long periods of time (two to ten years) before the diagnosis of syphilis is finally made.

17. Confusion in diagnosis between syphilitic iritis versus iritis due to some other cause in a syphilitic patient is frequent. The usually reliable therapeutic test is not to be depended on in late syphilitic iritis because of the slow response of certain syphilitic lesions and the nonspecific response produced by arsphenamin in certain nonsyphilitic iritides.

18. Repeated relapse is frequent in late syphilitic iritis, in contrast to the iritis of early and recurrent secondary syphilis.

19. Secondary glaucoma is an uncommon sequel of early and recurrent iritis, but is frequent and dangerous to vision in the late group.

20. The incidence of trauma in the etiology of syphilitic iritis and the effect of operative procedures on the eyes of syphilitic patients are briefly considered.

21. The treatment of syphilitic iritis, complicated or uncomplicated, is that of general syphilis; and should be given under the supervision or with the advice of the syphilologist.

22. The ultimate outcome of syphi-

litic iritis is good, so far as vision is concerned, in seventy percent of patients in the early group, in fifty-eight percent in the recurrent group, and in forty-two percent of the late group. Poor results, blindness or permanent visual impairment, are due partly to irremediable complications or sequels of iritis and partly to failure to arrive at an early diagnosis and to institute prompt treatment.

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Discussion: Dr. Derby: I should like to ask for a little more information in regard to keratoiritis and interstitial keratitis, and what the exact involvement of the cornea was. Perhaps Dr. Moore will want to be helped out a little bit on this by members of the ophthalmological department.

Dr. Moore: I should like very much to be helped out on that question by members of the ophthalmological department.

Dr. Derby: It is more the description of the clinical appearance and exactly what this involvement of the cornea was that I desire. For instance, Igersheimer questions a good deal, or at least he did in some figures that I saw some time ago, the actual occurrence of an interstitial keratitis in acquired syphilitis.

Dr. Moore: There were fourteen cases in which the diagnosis of interstitial keratitis had been made by the ophthalmologist. My figures are taken directly from their histories and I don't feel competent to discuss that aspect of the situation, for I see present two of the men who made those diagnoses.

Dr. Derby: May we hear from them?

Dr. Woods: I am in much the same position as is Dr. Moore. The patients reported by Dr. Moore are all dispensary patients, and they have been under the care of a number of different men on whose dispensary days they have attended the clinic. One ophthalmologist, therefore, has seen only a relatively small number of these patients. I recall several patients with definite interstitial keratitis and secondary iritis. Several other patients have had a primary iritis with the usual but quite marked secondary corneal involvement,

and the diagnosis of keratoconjunctivitis was made. There were, I believe, several cases of the so-called "keratitis profunda", but I did not recall personally having seen any of these. The exact answer to Dr. Derby's question would therefore require an exact analysis of the histories themselves, which has not been made.

DR. WILDER: Mr. Chairman, I intended to bring up this same question and ask for an elucidation of the facts regarding the fourteen cases that I noticed in the table which were diagnosed as interstitial keratitis, either as an associated condition or as an independent condition. Probably they were all associated. Were they not, Dr. Moore?

DR. MOORE: Yes.

DR. WILDER: I bring up this subject because I believe it is generally conceded that this condition of interstitial keratitis in acquired syphilis is one of the rarities of medicine and when it does occur it is apt to occur in the late stages of the disease. This struck me as a very large number of cases of interstitial keratitis in acquired syphilis. Holmes Spicer has been able to collect out of a large series of cases—I suppose Dr. Moore is familiar with his records—a number of such cases. But I can recall presenting a case some years ago to this section when it was doubted very much that there could be such a thing as an interstitial keratitis in acquired syphilis.

Interstitial keratitis in acquired syphilis is a very important subject not only in regard to the incidence but also in regard to the etiology; possibly the explanation of Igersheimer is about as accurate as any that we have had up to the present date, that it may be after all an allergic reaction (whatever that means) in a structure that is sensitized by spirochetes.

DR. KNAPP: Dr. Moore, what is your interpretation of recurring iritis? Do you regard it as a manifestation of an iritis which continues or some recrudescence in the syphilitic infection?

DR. MOORE: I should regard it as a recrudescence of the syphilitic infection, Dr. Knapp. You are speaking now of iritis as a recurrence phenomenon early in the infection?

DR. KNAPP: Yes.

DR. MOORE: The probable explanation is that the organisms were present in the eye when the patient first came in, although they had as yet produced no inflammatory reaction; that the appearance of an inflammatory reaction had been temporarily suppressed by the amount of treatment he had been given for his early secondary syphilis; and that at the time of recurrence the organisms remaining in the eye were not subject to the immunizing influences which otherwise the patient would have developed had he been untreated. That is to say, in treating a patient with early secondary syphilis one can distort completely the patient's reaction to his infection.

If a man is infected with syphilis and is allowed to develop secondary syphilis—skin rash and everything else—he will spontaneously heal all of his own lesions within a more or less variable length of time and will then enter into a state of latency which persists in many instances for an indefinite period of time, sometimes for a lifetime. If, on the other hand, one treats such a patient early in the course of his infection with such drugs as arsphenamin, one does for him what otherwise the patient would do for himself. The physician with his spirochetical drugs kills off the treponemes rapidly and prevents the patient from developing his own tissue immunity. It is quite conceivable that that is what happens in the eye.

The whole question of immunity in syphilis is, as Dr. Kolmer will testify, very imperfectly understood. The immunity is certainly not humoral; it is probably cellular. Syphilis probably affects various tissues in the body in various degrees so that all tissues in the body are not similarly immunized against the appearance of lesions. The eye would appear to be one of those tissues in which the development of an immune reaction may be inhibited by a small amount of antisyphilitic treatment. The patient often then drops the treatment and allows an interval of

time to pass before he gets any more.

DR. HOLLOWAY: I assume that all cases of a hereditary type have been excluded.

DR. MOORE: Yes.

DR. WILDER: If you have a patient over eighty years of age with no symptoms of syphilis but with repeated positive Wassermann tests, is a cataract extraction advisable without preliminary antisyphilitic treatment?

DR. MOORE: I should say that it was. There is no particular point in treating a man eighty years old who has no evidence of syphilis except a positive blood Wassermann test, and antisyphilitic treatment is not without danger. One might conceivably do such a patient much more harm than good. If after the cataract extraction he developed plastic iritis it would be perfectly possible to handle that by means of mild antisyphilitic treatment given subsequent to the operation.

DR. VERHOEFF: I should like to ask with regard to these relapsing cases, what was the usual interval between the relapses and how many relapses occurred.

DR. MOORE: You are referring now to this group of twenty-nine patients who had iritis as a relapse phenomenon?

DR. VERHOEFF: Yes.

DR. MOORE: The average interval between the last treatment and the appearance of the iritis was six months. That is artificially high by the inclusion of three patients in whom the relapse occurred after a long interval, two within about fourteen to sixteen months and one four years after the last treatment. In twenty of the twenty-nine cases the relapse occurred within four months after the last treatment. The question is as to the subsequent relapse of the iritis in those same patients, is it not?

DR. VERHOEFF: Yes.

DR. MOORE: There was no tendency to that phenomenon. There were perhaps two patients of the twenty-nine who showed subsequent relapsing iritis, but in most of them when the relapsed iritis was treated that was the end of it.

DR. ZENTMAYER: I wish to submit a question from the floor. Dr. John Green has submitted the following question: In the case of a needed ocular operation that without detriment to the patient could be indefinitely postponed, would you advise waiting until the serologic reaction was negative or would treatment for one or two months be sufficient.

CHAIRMAN JACKSON: This question illustrates the extreme complexity and broad bearings of this investigation and we may have to go without answers to some questions that we should like to have answered, but as long as we have time we shall ask as many as we can.

DR. MOORE: I meant to say something about that in the body of this communication and unfortunately omitted it. I assume you refer to an operation of election that can be postponed. A positive blood Wasermann reaction is not a contraindication to operation on the eye or elsewhere, and from our standpoint there is no necessity for waiting until the Wassermann reaction becomes negative. As a matter of fact that is a goal that is sometimes never achieved. There is a considerable number of patients in whom it is never possible to get a negative Wassermann, and if one waited in such cases until the Wassermann became negative one would never operate.

It suffices in patients with late syphilis to give a month or so of antisyphilitic treatment before the operation and to continue it immediately afterwards. The immediate continuance of treatment after the operation is of course much more important in early than in late syphilis. In early syphilis continuous treatment is almost a sine qua non of success. To allow a rest interval of three or four weeks to enter into the midst of treatment is sometimes extremely dangerous. In late syphilis that danger is not so great, but for the sake of the operated eye it is desirable to continue antisyphilitic treatment immediately after the operation.

CHAIRMAN JACKSON: Are there any further questions?

DR. DE SCHWEINITZ: This question has been handed in: Has neoarsphenamin treatment of syphilitic patients with

acute iritis shown any tendency to aggravate the iritis?

DR. MOORE: There is reported and we have observed in a small number of cases the phenomenon which is known as the Jarisch-Herxheimer reaction. This consists of a sudden intensification of the syphilitic lesion within twenty-four to forty-eight hours following the first injection of an arsenical drug. It does not occur after subsequent injections. It is somewhat analogous to the focal reaction which is produced in a tuberculous lesion by the subcutaneous administration of tuberculin. It is of very little clinical importance in the eye. I shouldn't say that. I should say that it is of very little importance in syphilitic iritis, though it may be of considerable clinical importance in certain other ocular lesions. I have never seen an instance of syphilitic iritis which did not heal promptly as a result of continued antisyphilitic treatment, although there may be a temporary flareup following the first injection of the drug on the basis of this reaction. The reaction is assumed to be due to the death of a large number of treponemes with the liberation of their endotoxins, if they have any, or the sudden release of the products of inflammatory tissue in course of resolution.

DR. WILMER: Here is a question that has been submitted:

In the absence of a positive syphilitic reaction how can you ascribe syphilis as a cause of any given case of iritis? On previous history?

DR. MOORE: By a positive syphilitic reaction I assume that the Wassermann was meant.

I should say that it was quite impossible to say that a given patient had syphilitic iritis if he had a negative Wassermann reaction, if he had no other evidence of syphilitic infection and if he had no history of syphilis. Of course it is very hazardous to make a diagnosis of syphilis on the basis of history alone. The history of early syphilis particularly may be a very hazy thing. In the patients in this series there were only three out of the whole group (249) in whom there was not perfectly definite, positive evidence of syphilis, either on the basis of the blood Wassermann reaction, spinal fluid examination, or the presence of syphilitic lesions elsewhere in the body. In those three the evidence of syphilis seemed to be the prompt response to a therapeutic test.

That, as I indicated in the body of the paper, is a very hazardous thing on which to base a diagnosis of syphilis because of the nonspecific response which arsphenamin sometimes produces. Nevertheless in these three instances the response was so prompt as a result of arsphenamin treatment that it seemed justifiable to include them in this type of study, although I still hesitate a little as to the definiteness of the diagnosis.

DR. CLAPP: This question is from the floor: In recurrent syphilis is the iritis any less severe than in early syphilis?

DR. MOORE: I should say about the same, except that in recurrent iritis the tendency for the iritis to be unilateral rather than bilateral was quite marked in our material. I am not sure of the exact accuracy of my figures but I think that sixty of the 111 patients with early syphilis had bilateral iritis. In the relapsed group only five of twenty-nine had bilateral iritis, in the other twenty-four the involvement was unilateral. Except for two cases the relative severity of the iritis in the recurrent group was about the same as in the early group.

DR. DE SCHWEINITZ: Question from the floor: In the treatment of syphilitic eye conditions is it better to start treatment with bismuth?

CHAIRMAN JACKSON: There is some question as to whether this comes within the range of etiology of iritis, but we don't often have a chance to hear from an expert on such questions.

DR. MOORE: Mr. Chairman, that takes us a little far afield from the question of iritis. If the question is to be limited to syphilitic iritis it is better to start treatment with arsphenamin than with bismuth. There are many other ocular lesions of syphilis besides iritis, however, in some of which arsphena-

min treatment at the beginning of things may result in difficulties. One such lesion is primary optic atrophy, but to get into a discussion of primary optic atrophy would lead us too far afield I think from the subject of this paper.

CHAIRMAN JACKSON: Are there any other questions that members of the Commission have received from the floor?

DR. DE SCHWEINITZ: Question from the floor: Which is more important, clinical or laboratory findings? In the case of negative laboratory findings what is your treatment?

CHAIRMAN JACKSON: Perhaps that question, except the part as to what is your treatment, has been pretty well alluded to in Dr. Moore's paper, but if he has a brief answer to that we will be glad to hear it.

DR. MOORE: There are two questions contained in that question. As to which is the more important, clinical or laboratory findings, I am afraid I can't answer that. I don't know. It depends on the complete study of the individual patient and it seems to me quite impossible to arrive at any evaluation as to how to treat a patient with syphilis unless one has examined him thoroughly from top to toe. It certainly does not depend on whether his blood Wassermann reaction is positive or negative. The diagnosis of syphilis is of course permissible in the presence of a negative blood Wassermann test, whether syphilis of the eye or syphilis of various other portions of the body, and one's treatment doesn't vary particularly depending on whether or not the patient's Wassermann reaction is positive or negative.

I assume that the question has reference to the length of time for which one should treat such a patient. The treatment of syphilis under any circumstances is a long-drawn-out business which takes, in the case of early syphilis, a year to a year and a half; in the case of late syphilis, depending on what the manifestation in question is, anywhere from one to seven or eight years to get satisfactory end results.

DR. DE SCHWEINITZ: Mr. Chairman, I should like to endeavor to clear up the question of diagnosis referred to by my alert colleague here. Am I correct in assuming the essayist in his admirable paper maintains that a clinical diagnosis of syphilitic iritis is not of any particular value, is not to be trusted? It is the present speaker's impression that the picture of the iris in acute syphilitic iritis is a different one from the picture of the iris acutely inflamed from other causes. Isn't that your opinion?

DR. MOORE: Yes.

DR. DE SCHWEINITZ: Especially, Mr. Chairman, since the newer methods of examination are employed.

DR. MOORE: Mr. Chairman, that question of course lies outside of my particular province. And the statement which I made in the body of this paper is a quotation, possibly a misquotation, from some of my ophthalmological friends who have led me to believe, perhaps incorrectly, that it is extremely difficult to differentiate syphilitic iritis from other types of iritis on examination of the eye, except in the case of iritis papulosa, or so-called plastic iritis.

DR. DE SCHWEINITZ: In the earlier stages?

DR. MOORE: Yes.

DR. VERHOEFF: I should like to ask the essayist if he had any cases of unilateral syphilitic iritis which were treated with arsphenamin in which while the iritis was subsiding in one eye an attack began in the other eye?

DR. MOORE: I don't recall any such case.

TUBERCULOSIS IN THE ETIOLOGY OF ACUTE IRITIS

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If acute tuberculous iritis occurs it is usually an early symptom of what will later become a chronic disease. Acute relapses often occur in the chronic form. Four clinical cases are recorded and experimental findings are summarized. From the department of ophthalmology, University of Colorado. Read before the Association for Research in Ophthalmology, June 24, 1930.

The scope of this paper is limited to acute tuberculous iritis. Since there are few cases of the purely acute form on record, the discussion will be short. Had the subject assigned to me included chronic tuberculosis, a very lengthy paper would have been necessary to cover all phases of the disease.

Tuberculosis of the iris, like tuberculosis in other parts of the body, is essentially a chronic disease. It is characterized chiefly by the formation of nodules in the iris stroma, deposits on the posterior surface of the cornea that resemble cold mutton fat, and eventually the absorption of iris pigment. The diseased process is rarely confined to the iris but is usually associated with tuberculosis of other parts of the uveal tract. Acute diffuse iritis without nodules has been reported as tuberculous, but in most of the cases the diagnosis has been made from the clinical picture and not verified by microscopic examination or animal inoculation. In the early stage simple diffuse iritis often precedes the nodular form and it is possible that in some cases recovery may occur without the formation of tubercles.

Poncet[1] was probably the first person to describe a case of simple acute iritis that was due to tuberculosis. Later Fonsagrives reported similar observations. Their diagnosis was based on the fact that the subjects under their care had active general tuberculosis at the time the ocular process appeared. Their conclusions, however, were not verified by pathological findings, or by the demonstration of tubercle bacilli in the ocular fluids.

Vigne saw a case in which there had been recurrent attacks of iritis. Thinking that an iridectomy might favorably influence the disease, he excised a portion of the iris and introduced it into a guinea pig. The animal died in due time from generalized tuberculosis. Iridectomy did not cure the disease as Vigne had hoped, but it recurred and tubercles appeared in the iris stroma. The general condition progressed and the patient eventually died from tuberculosis. His case was one of acute recurring diffuse iritis that eventually ran a chronic course and was similar to the acute iritis that occurs from causes other than tuberculosis.

Heine[2] described a case as acute tuberculous iritis, in a man with symptoms of general tuberculosis. After rest, general hygienic treatment, and improvement in health, the iritis subsided, and it did not recur. He based his diagnosis on the simultaneous improvement in the two conditions, and gave no other evidence that might prove conclusively that the process was tuberculous in character.

In a critical review of the literature, it was found that most of the recorded cases of acute tuberculous iritis were no more convincing than those of Poncet, Fonsagrives, and Heine. It is probable that acute tuberculosis of the iris is occasionally overlooked and the disturbance ascribed to some other cause. Without the presence of nodules in the iris it cannot be differentiated clinically from other forms of acute diffuse iritis. The only means available for accurate diagnosis is histological examination or animal inoculation of excised iris tissue. This is obviously impracticable in most cases.

That acute symptoms may usher in a chronic tuberculous iritis is beyond question. In the nodular form one occasionally sees an acute onset, and in

the beginning of the disease the inflammation resembles the iritis that occurs in focal infections, syphilis, and so on. The pain, photophobia, and other symptoms may be less severe in tuberculosis, but in other respects the symptoms may be the same.

In a few weeks, however, so-called mutton-fat deposits appear on the posterior surface of the cornea in the tuberculous type, and nodular thickenings appear in the iris stroma or on its surface. Careful search with the corneal microscope reveals evanescent grayish nodules at the pupillary margin of the iris. These have been described by Gilbert, Koeppe, and others as being characteristic of either tuberculosis, syphilis, or sympathetic ophthalmia. With the appearance of nodules in the iris stroma, and the exclusion of syphilis and sympathetic ophthalmia, the diagnosis becomes easy.

Acute attacks may also occur during the course of a comparatively chronic iritis. Occasionally one sees acute cases of the diffuse type that gradually become subacute without the development of tubercles until several months after the onset of the iris process. This is clearly illustrated in the following reports of four cases that have been under my care for long periods of time.

Case 1: Miss F., aged twenty-two years, was first seen June 10, 1929, at which time she complained of moderate pain in the left eye. There was photophobia, slight lacrimation, and moderate circumcorneal injection. The pupil was contracted, the iris vessels engorged, the stroma thickened, and the iris pattern lost. With the slit-lamp and the corneal microscope edema of the corneal endothelium was discovered, in addition to fibrin and cells in the aqueous. No nodular thickenings of the stroma or gray nodules in the pupillary area of the iris could be found. The fundus was normal and the vision was only slightly reduced. The Wassermann reaction was negative and no evidence of focal infection could be found after painstaking examinations. There was no cough and the chest was free from râles or other evidence of tuberculosis. X-ray study of the chest showed it to be normal.

After using atropin and other local measures, the acute symptoms subsided. This state of affairs continued for nine weeks, after which a small circumscribed area of thickened iris stroma was discovered in the pupillary zone above. The vessels that radiated from the iris base toward the tubercle were slightly engorged. The tubercle did not caseate but remained confined to the iris stroma for four weeks, then gradually disappeared without leaving any trace of its former existence. A small tag of pigment on the anterior lens capsule that could only be seen with a widely dilated pupil was all that remained. On two occasions a small fibrinous nodule that disappeared in a few days was noted at the pupillary margin. In all five nodules have appeared in the iris stroma at various times but all have subsided without leaving traces.

Old tuberculin was given subcutaneously for diagnostic purposes and a focal reaction in the iris was obtained. No constitutional or local reaction occurred, however, until large doses of the bacillary emulsion were given during the course of treatment, when local reactions occurred at the site of the subcutaneous injections. Six months after the onset of the iritis fine mutton-fat deposits appeared on the posterior surface of the cornea. These have never been numerous or large and are still present. Even with rigid hygienic measures, including three months rest, tuberculin, and heliotherapy, mild acute attacks occurred when atropin and other local measures were withdrawn. The fundus has escaped invasion, and with correcting lenses the vision remains normal.

This case* was almost certainly tuberculous. Acute iritis ushered in a chronic process, and acute attacks

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* On July 1st, the vitreous became hazy and the vision dropped to 20/50. A beginning periphlebitis was found in retinal veins near the periphery of the fundus. A massive hemorrhage into the lower portion of the vitreous occurred July 10th, and numerous hemorrhages were discovered in the retina near the optic nerve. Vision = 20/200.

could be evoked at any time by discontinuing local treatment. The absence of focal infection and other causes of iritis, taken with the focal and local reactions to tuberculin, almost certainly prove the case to be tuberculous.

Case 2: A young man aged twenty-one years, four months previous to examination, had first noticed enlargement of the cervical lymph gland. Mumps was suspected, but the condition spread to the axillary and inguinal glands and a diagnosis of Hodgkin's disease was made. The blood picture did not conform to this condition and it was not until acute ocular symptoms occurred that the nature of the process was suspected. The eye symptoms were severe photophobia, lacrimation, loss of visual acuity, and moderate pain, that is, the symptoms of acute iritis.

In the course of a few weeks several small yellowish nodules appeared in the stroma and on the surface of the iris. It was at this stage that I saw him first on November 7, 1928. At that time there was circumcorneal injection, the aqueous was turbid and mutton-fat-deposits were present on the posterior surface of the cornea. The pupils were irregular, and the iris was covered with innumerable small yellowish tubercles. In both eyes conglomerate tubercles were beginning to form near the base of the iris. The Wassermann reaction was negative and no foci of infection were found.

There was evidence of beginning activity in both lungs, and x-ray examination of the chest showed numerous shadows that represented tubercles scattered throughout the lungs. Headache was complained of and rigidity of the neck muscles was present. A suspicious Kernig's sign was elicited; and a diagnosis of miliary tuberculosis with beginning meningitis was made. Under complete rest, hygienic measures, and generalized heliotherapy, marked improvement occurred in the physical condition; the headache disappeared and the patient gained ten pounds in weight over a period of three months. The eyes, however, showed little change, and when he was last heard from three months ago the eyes were blind. This remarkable case is one of the few that have recovered from a miliary tuberculosis with beginning meningitis. The onset of the eye condition was acute and acute exacerbations occurred during the chronic process.

Cases 3 and 4: These, having had similar symptoms, are reported together. Both occurred in women over fifty years of age; in both, the onset was acute and acute phases occurred during the chronic process. Both eventually showed iris tubercles, and mutton-fat deposits of large size were present on the posterior surface of the cornea for long periods of time. In both the process began in one eye several years before the second eye became involved. In one, the condition in the first eye terminated in a massive tubercle occupying the region of the base of the iris. The cornea was also slightly invaded. In one the eye was enucleated and microscopic examination revealed a large conglomerate tubercle in which a small number of tubercle bacilli were found. In the second case caseated tubercles occurred in the cornea and vision was completely lost. The globes eventually became shrunken but did not rupture. Operative interference for a cosmetic reason and to obtain the eyes for biopsy was refused; and in this case microscopic proof was lacking. Neither of the patients had demonstrable evidence of active or latent tuberculosis.

All four of the recorded cases, it seems to me, were tuberculous beyond question, and they prove that an acute attack of iritis may usher in a chronic tuberculous process, or may occur during the course of a chronic iritis.

Animal experiments

Much has been contributed to our knowledge of tuberculosis of the eye by animal experimentation. Outstanding work on this subject has been done by Hosch[3], Valude[4], Kostenitsch and Wolkow[5], Stock[6], and Lagrange[7]. Stock definitely proved that tuberculosis fre-

quently caused chronic uveitis. He concluded that when other etiological factors were excluded tuberculosis could be ascribed as the etiology of chronic disseminated chorioretinitis. He laid little emphasis on acute forms.

In 1920 I began a series of experiments on rabbits to determine the nature of ocular lesions after the injection of living and dead tubercle bacilli. Emulsions of bacilli were injected into the carotid artery on one side and in the majority of instances tuberculosis occurred in the eye on the side that was injected. It was found that the uveal tract was most susceptible to infection and in the greater number of cases the first manifestations in the eye were confined to this part. The choroid, possibly because of its greater area, was most severely affected, but the ciliary body and iris were invaded also. In no case was the iris invaded without some evidence of tuberculosis in other portions of the uveal tract.

Three forms of iritis occurred. These I classified into acute diffuse iritis and ridged and nodular forms. The diffuse form usually began on the second day after the injection, although in some animals symptoms did not appear until the fourteenth day. In the majority of the animals the first change was contraction of the pupil. This was frequently seen several days before the appearance of other manifestations. In the most acute cases, hemorrhages occurred into the iris and anterior chamber, and the aqueous became turbid. The iris became uniformly thickened. On the fourth day the swollen stroma became irregular and was thrown into folds that radiated from the base toward the pupil. In severe cases blood vessels soon began to proliferate and appeared on the surface of the ridges. A serous exudate filled the pupillary area and was deposited on the anterior lens capsule, in addition to gravitating into the lower angle of the anterior chamber. Numerous cells could be seen floating in the aqueous but no mutton-fat deposits appeared on the posterior surface of the cornea at this time. In a few cases the inflammation gradually subsided and no other symptoms occurred. In others inflammation gradually disappeared but was followed in a few months by slight but uniform atrophy of the anterior pigmented layer of the iris stroma.

In a series of over two hundred animals, only three followed the acute course. In the remainder the condition was progressive, and a few days after the onset of the ridged iritis grayish-yellow round or oval areas were seen pushing through the iris stroma. They were usually located at the base of the ridges near the angle of the anterior chamber. Occasionally some appeared in the pupillary zone. The enlargement continued and eventually the tubercle protruded into the anterior chamber. Newly formed blood vessels ran over the surface of the tubercles. At this stage all acute symptoms subsided, and the process continued in a chronic form for several months.

In fulminating cases the cornea became hazy at the time that ridges appeared. This change progressed rapidly and in two or three days the cornea became white and resembled coagulated albumin. The condition went on to either ulceration or vascularization and ultimately to shrinking of the globe.

The histological picture of early experimental iritis was first an endarteritis of the smaller blood vessels in the region in which bacterial emboli had lodged. Later epithelioid cells appeared in the iris stroma around occluded vessels, and fibrin was usually present on the surface of the iris in the region of densest infiltration. When the eyes were enucleated early, before necrotic changes had occurred, the infiltrates in the iris stroma were made up entirely of epithelioid cells. In more advanced cases nodules appeared with necrosed cells, giant cells, and caseation, in addition to small round cells in the periphery of the lesion. Other changes occurred after the acute process had passed. They will not be described as they have no bearing on acute iritis.

From the study of experimental

tuberculosis in animals it is evident that iritis of tuberculous origin may begin in an acute form but that the acute process is usually an early manifestation of what will eventually be a chronic disease, and in this respect it conforms closely to what occurs in man.

I have intentionally omitted discussing the case that is being reported by Verhoeff before the Section on Ophthalmology, because I feel that his paper should not be mentioned until it is officially presented before that body.

Conclusions

1. Acute tuberculosis of the eye is rarely recognized as a distinct clinical entity in ophthalmic practice.
2. The clinical appearance of acute tuberculous iritis is usually similar to acute iritis from causes other than tuberculosis, although it is likely to run a milder course.
3. When acute tuberculous iritis occurs it is usually an early symptom of the chronic form of the disease.
4. Acute relapses often occur in the chronic form.

920 Republic building.

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Discussion: DR. FINNOFF: At the time that I was asked to discuss this question I didn't realize the difficulty that I should have in evaluating the frequency with which tuberculosis plays a part in acute iritis. Had the subject of chronic iritis been assigned to me I might have written a monograph.

CHAIRMAN DE SCHWEINITZ: Are there any questions from the Commission or from the floor on this paper?

DR. JACKSON: Mr. Chairman, can any share in the etiology of acute tuberculous iritis be ascribed to local trauma? We have ascribed the beginning of parenchymatous iritis to local trauma. Tuberculosis of the bones, particularly of the vertebræ and hip joints, has long been ascribed partly to trauma. It is perhaps a pertinent question and one of practical importance to ask whether trauma has any share in tuberculous iritis.

DR. FINNOFF: I think that trauma plays only a small part in tuberculous iritis. In experimenting on animals with known tuberculous iritis we have traumatized the eye by striking with blunt instruments and the condition was not materially aggravated. By the introduction of sharp instruments and traumatizing the iris in that manner the process was slightly aggravated for a short period of time, but the reaction was not much more severe than it would have been in a normal iris after a traumatizing in the same manner.

DR. HOLLOWAY: An inquiry from Dr. John Green: Is it possible on clinical appearance alone to establish a presumptive diagnosis of tuberculous iritis in its early stages—in the first acute attack?

DR. FINNOFF: I think that the diffuse form cannot be differentiated from other forms of iritis. After the appearance of nodules in the iris stroma the diagnosis I think can be made after the

exclusion of syphilis and sympathetic ophthalmia. It is probable that the nodules that have been described by Gilbert and Koeppe as occurring at the pupillary border are evidence of tuberculosis after excluding syphilis and sympathetic ophthalmia.

DR. KNAPP: Dr. Finnoff, if acute iritis starts in a tuberculous individual is it your experience that the tuberculous process in the lungs is an active one?

DR. FINNOFF: Of the cases that I have seen only one showed activity in the lung and that was a case of miliary tuberculosis in which we should expect to find activity not only in the lung but in other portions of the body. As a rule it occurs in persons with latent tuberculosis and often the primary lesion cannot be found.

DR. DERBY: A question by Dr. Black: What about tuberculous iritis following trauma of iris by operative procedures, in case of fibrous tuberculosis of the lungs?

DR. FINNOFF: Operative procedure in tuberculosis of the iris aggravates the inflammation. The process in the eye is usually chronic in character. The inflammation lasts for a long period of time, and eyes of that type should not be operated upon until the iris process or the uveal process has been quiet for a long time, months or even years.

DR. DERBY: Dr. Black says there was no evidence of iritis before the operative procedure.

DR. FINNOFF: If there is no evidence of iritis before the operative procedure I think I should not hesitate to operate.

DR. DERBY: Dr. Gradle asks: Is the proper terminology "tubercular iritis" or "tuberculous iritis?"

DR. FINNOFF: It can be used either as "tubercular" or "tuberculous" but "tuberculous" is preferred.

DR. ELLETT: Do you think it is safe to provoke a focal reaction for diagnostic purposes in a case of iritis?

DR. FINNOFF: If the process is confined to the iris and the condition is not acute with marked exudation I think that it is safe and desirable.

DR. WILDER: What value do you place upon tuberculin tests in determining the etiology of a lesion of the eye?

DR. FINNOFF: I might answer that question by saying that several years ago I placed great faith in diagnostic focal reactions at the site of the lesion in the eye. Recently Dr. Thygeson and I have carried on a series of experiments on animals in which we had known ocular tuberculosis. Tuberculin had been injected in those animals and we had obtained focal reactions. We felt rather encouraged by that result. However, after using milk, typhoid vaccine, and other foreign proteins, we have also seen reactions that were as severe as the reactions that were produced by tuberculin.

It is possible that tuberculin gives a more sensitive reaction, but we feel that it is not specific and is of questionable value for diagnostic purposes. However our experiments have not reached the point where we wish to make an absolutely conclusive statement on this question.

NODULAR OPACITY OF THE CORNEA

Report of case

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The condition has been described under various names, with certain features in common to the various cases. In the case here reported the corneas were subjected to Wiener's wedge operation followed by radium applications, but without benefit. The excised specimen is described histologically. The characteristic lesions are in the superficial layers of the corneal stroma, and consist of nodules and interlacing lines; the nodules being probably hyalin. Read before the American Ophthalmological Society, June 4, 1930.

In 1890 Groenouw[1] first described a condition which he called nodular corneal opacities. He followed this in 1898 with a communication[2] reporting the anatomical findings in one of the cases. His third and last report,[3] in 1917, described transmission of the disease through three generations. Since Groenouw's original communication, many authors have written on the subject under various titles. The most common designations have been nodular opacity, nodular degeneration, familial degeneration, nodular keratitis and lattice-shaped opacity or grill-like opacity. The clinical appearance as described by the various authors does not always seem identical; yet all of the cases have several features in common.

These characteristics are: (1) There is usually a history of the affection in more than one member of the family. (2) It is slowly progressive over a period of years, with or without periods of mild irritation until useful vision is lost. (3) No certain etiological factor can be demonstrated and no therapeutic measure is of much value. (4) The lesions are bilateral and are rather superficial, although in the later stages the deeper layers of the cornea may be involved.

Since the first description of the disease, many cases have been described in the literature. John Green, Jr., in 1909, stated that but twenty-two authentic cases were on record. Many have been added since. I have made no attempt to find a record of all such cases. The best discussions in the German literature are by Groenouw, Fuchs[4], Fleischer[5], Landenberger[6], Paderstein[7], Videky and Goldzieher[8], Wenistein[9], Uhthoff[10], Deutschmann[11], Car[12], Stanka[13], Kraupa[14], Pillat[15], Wehrli[16] and Yoshihara[17]. Jacqueau[18] and Puscariu[19] have contributed to the French literature and Hancock[20], Folker[21] and Collins[22] to the English. Among Americans who have written on the subject are John Green, Jr.[23], Roy[24], Buchanan[25] and recently Zentmayer and Rush[26].

Groenouw described the disorder in the following words: "The affection consists in the appearance of numerous small, rounded or crenated, grayish nonconfluent opacities in the otherwise clear corneal tissue. The larger opacities barely reach 0.25 mm. in diameter; between these lie much smaller dust-like gray dots. The spots occupy principally the central portions of the cornea, leaving the margin more or less free. The larger nodules cause the epithelium to bulge slightly and thus induce an irregular curvature of the corneal surface. The opacities seem to originate gradually, without inflammatory manifestations, and remain unchanged for years."

Had Groenouw possessed a slit-lamp at that time, he probably would have added that the larger opacities represented clusters while the dots were single areas of degeneration. Subsequent writers have described cases in similar terms with slight variations, many of them noting grill-like or lattice-work opacities with or without nodules.

Case report

C. E. Bird, aged fifty-two years, a brick mason, consulted me April 27, 1928, complaining that his vision had begun to fail about eighteen years

previously. He had never had much discomfort though at times there had been attacks in which his eyes watered

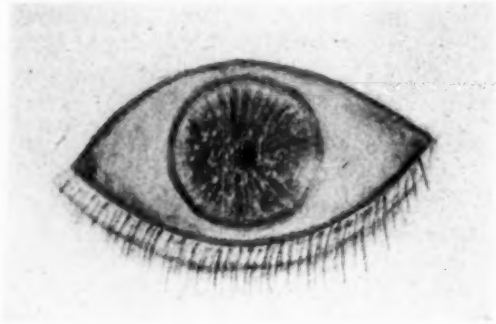


Fig. 1 (Goar). Showing appearance of cornea with the loupe and oblique illumination.

and were sensitive to light. He attributed this to getting brick dust in his eyes. He had been unable to see to read for four or five years. He had three brothers and three sisters. One brother and one sister had had eye trouble which the patient thought was similar to his. Dr. Daniel B. Kirby had the brother under observation and writes that his diagnosis was Fuchs's dystrophy of the corneal epithelium. The father and mother had no eye

Fig. 2 (Goar). Showing appearance of cornea by biomicroscopy (× 25).

disease, but a paternal uncle's sight was affected in the same way as the patient's.

The vision was O.D. 10/200, O.S. 4/200. The conjunctivas were normal. There was no congestion of the eyes.

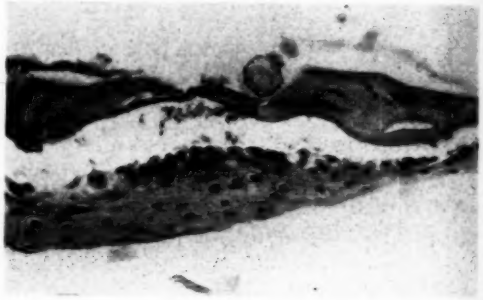


Fig. 3 (Goar). Showing hyalin-like nodule in superficial stroma of cornea.

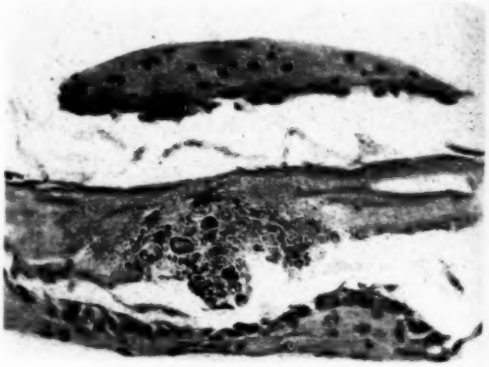


Fig. 4 (Goar). High-power magnification, showing several small granules of hyalin-like substance.

Fig. 5 (Goar). Showing irregularity of layers of epithelium, lamellation of stroma, and vacuolation of basal epithelial cells.

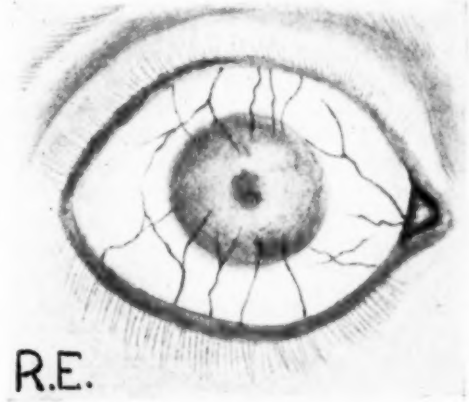
The sensation of the corneas was much diminished. The corneas had lost their luster and upon casual inspection looked as though they had been smeared with shellac. On close examination with the loupe and lens it was noted that the superficial part of

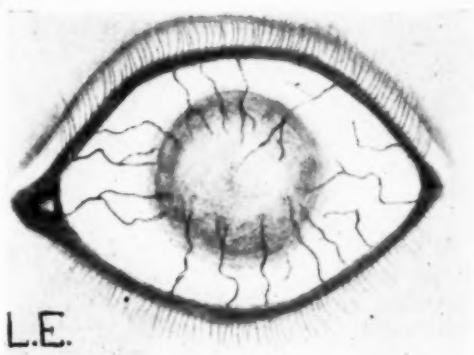
each cornea was crisscrossed with interlacing lines, giving much the same appearance as a section of lung tissue under the microscope. Scattered through this lattice work in an irregular manner were tiny nodules of a dirty gray or grayish yellow color. With the slit-lamp it was noted that the larger areas contained as many as five nodules, while the smaller ones were single or in pairs. They were imbedded in the superficial part of the stroma, and the grayish lines mentioned above were apparently in or just beneath Bowman's membrane. The whole surface of both corneas, except a narrow ring adjacent to the limbus, was affected. The tension of the right eye was 25 mm., that of the left 14 mm. (McLean). The superficial layers of the cornea could be elevated in plaques.

On one occasion I denuded the whole left cornea, placed the specimen in a rapid fixing solution and obtained the sections shown in the slides. Following the denudation, I scraped the cornea rather vigorously and reexamined the eye with the corneal microscope. Very few of the nodules had been dislodged by the scraping, but were still firmly imbedded in the cornea. The epithelium healed slowly, a small area in the center remaining unhealed for several weeks. No vascularization was noted in either cornea. The vision in the left eye improved to 20/200.

The patient had been carefully examined by an internist who found nothing that would throw any light on the cause of the disease. The eyes were treated with dionin and hot applications with no improvement. In October, 1928, the patient complained that the eyes were sensitive to light, that they watered and ached at night. There was slight circumcorneal injection and other evidence of irritation. He was placed on atropin, hot applications and holocaine instillations, and was given some injections of diphtheria antitoxin. Within six weeks after the first signs of irritation both corneas were densely infiltrated and vascularization had begun from all sides. Vision had dropped to hand movements. The condition now closely resembled the peak of interstitial keratitis. The irritative stage gradually subsided leaving both corneas opaque and densely vascularized. The patient entered an institute for the blind where Wiener's wedge operation was done followed by radium applications. I could not see that he was benefited by this procedure.

Description of specimen: The epithelium is very irregular in contour, in some areas being thickened to twelve or more layers, in others, thinned to barely two or three. The thinning occurs over irregularly spherical nodules which stain pink with eosin and yellowish with the indigo-picric acid-carmine stain. There is not much change in the epithelial cells except that the basal cells have lost their columnar aspect and individual cells are packed closely together. In some areas the cytoplasm appears vacuolated. No vestige of Bowman's membrane can be





Figs. 6 and 7 (Goar). Corneas after subsidence of severe inflammatory reaction.

found. The stroma takes a heavy eosin stain and there is a marked tendency to splitting into lamellæ. The nodules which lie just beneath the epithelium are always separated from it by a thin layer of connective tissue. The nodules consist of an amorphous substance, staining yellow with the picric acid, and resembling hyalin. No granules of this substance are found in the epithelium.

A few histological examinations of this condition have been made by other observers, usually from scrapings or trephine borings; one examination was by Paderstein who secured the entire globe. Groenouw removed a thin section from the cornea of one of his patients and examined it histologically. He found that the nodules were situated in the superficial layers of the substantia propria, and, by differential staining and chemical reactions, surmised that the substance was hyalin. He suggested that the gray streaks were due to serial apposition of the deposits and that the fine punctiform opacities were enlarged corneal corpuscles. The epithelium was altered in only one place and this was regarded as an artifact.

Paderstein examined the eyeball of a patient who had died as the result of an accident. There were advanced changes in the epithelium and Bowman's membrane. He thought the foreign substance was hyalin and was formed in or from the epithelium apposed to Bowman's membrane, and that the grill-like and macular opacities were based on similar changes.

Wirth examined sections of a case that he had observed for several years. He states that the histological basis consists in focal deposits of a peculiar substance in the upper layers of the parenchyma and the epithelium, which from its chemical and tinctorial behavior is undoubtedly hyalin.

Uhthoff examined sections from a recent case before the deposit of hyalin masses had occurred. He states that the first pathological phenomenon occurs in the domain of Bowman's membrane: proliferative processes are shown in front of and behind the membrane. The corneal corpuscles are enlarged and in part show a distinct finely granular protoplasm. In some areas Bowman's membrane is entirely absorbed.

The cause of nodular opacity of the cornea is obscure and has been the subject of much debate. Fuchs states that "it is a nutritional disturbance or dystrophy, which is characterized by the excretion of substances which have become insoluble in the tissue juices." He mentions that disturbances of internal secretion may be suspected as playing some part in the etiology, though this remains unproved. Treacher Collins classifies the condition as an abiotrophy and considers it as a neurotrophic disorder—a primary dystrophy of the nerve fibers and their end-organs. His argument is based on the similar distribution of the lesions with that of the nerve fibers and endings. Kraupa and Pillat hold similar views in regard to the pathogenesis. Stanka claims to have disproved the neurotrophic theory by a process of vital staining and he supposes a degenerative process of the corneal lamellæ, or a hyalin degeneration in the domain of the corneal corpuscles themselves, which have been transformed into a peculiar glassy substance or are replaced by this substance.

Wehrli found histological changes that convinced him that the condition is tuberculous, and as his cases showed some clinical evidence of tuberculosis he proposed that the disease be designated "lupus of the cornea." Puscariu's two cases showed some clinical evidence of tuberculosis, but, from her histological examination of a section of the cornea, she gave her opinion that the condition was degenerative rather than tuberculous. John Green, Jr., described a case that had a family history of tuberculosis, and had several old lesions of the skin that were diagnosed as tuberculous and which reacted both generally and locally to tuberculin. Moreover, there was a decided improvement on tuberculin therapy. Green concluded that while some of these cases may be due to a degenera-

tive process, others may be regarded as attenuated forms of tuberculosis of the cornea.

I have found no record of a case that has undergone so violent an inflammatory stage as in the one I have described. It is true that this patient was seen in the late stage of the disease after many years of slow progress, with occasional attacks of mild irritation. No evidence of tuberculosis or syphilis was found in the patient, but the rapid progress suggests a toxic reaction rather than the end result of a purely degenerative process. No therapeutic measure used had the slightest effect as to staying the course of the disease, and I am not convinced that either denudation of the cornea or the use of irritants such as dionin is justifiable in this disease.

Summary

1. Nodular opacity of the cornea is characterized by its tendency to appear in certain families, its bilateral distribution and its slow progression with occasional periods of irritation until useful vision is lost.

2. The etiology is unknown. The three most plausible theories are (a) that it is a hereditary form of degeneration of the superficial lamellæ, (b) that it is neurotrophic in character, i.e., that the degeneration affects the terminal nerve fibers and nerve endings, and (c) that it is tuberculous in origin.

3. The characteristic lesions are in the superficial layers of the corneal stroma and consist of nodules and interlacing lines. The nodules are composed of a substance which is probably hyalin.

4. The case here reported suffered a severe inflammatory reaction causing an intense opacification and vascularization of the corneas.

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THE CONTRIBUTIONS OF PROFESSOR ERNST FUCHS TO OPHTHALMIC PATHOLOGY

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Fuchs's very numerous and comprehensive studies in pathological research were devoted especially to discovering the morphological basis of disease. A list of Fuchs's contributions in this department of ophthalmology is appended.

"Clarity, calm, and good will, combined with an untiring joy in labor and . . . a superb integrity, seem to me to be the characteristics which have made Fuchs, for over a quarter of a century, a leader of our art". Such is the just tribute written fifteen years ago by his colleague and friend Hirschberg. Fuchs possessed an extraordinarily integrated personality, so thoroughly at one with himself and his environment that in his earliest written works there appear those same features which, in his maturity and old age characterized all of his human relationships. His clinical, pathological, and anatomical researches are so bound together by his wide view of ophthalmological problems as to make the separate evaluation of one phase of these contributions an almost impossible task. To his pathological researches he brought the light of his extraordinary clinical acumen and the profound erudition of his anatomical knowledge, while on the other hand his clinical writings are from the very first illuminated by his morphological studies. Nowhere is this more characteristically shown than in his textbook in which the morphological basis of the signs and symptoms of disease is used throughout to clarify the clinical discussion. The book serves almost equally well as a textbook of ophthalmic pathology or for a textbook of clinical ophthalmology.

Many of Fuchs's early studies have become so deeply rooted in our common knowledge that his contribution has been almost completely forgotten. In his student days, while still an assistant to Professor Arlt, he published the first comprehensive studies on the pathology of the chalazion[1]. This was followed a few years later by similar studies concerning the pterygium[2] and the pinguecula[3]. Little has been added to our knowledge of these subjects in the fifty odd years that have elapsed since those studies were published. Characteristically his study of the chalazion led him back from pathology to normal anatomy, and the same period saw the publication of his work on the anatomy and physiology of the blood vessels and lymphatics of the lids[4].

Among his numerous writings certain themes of recurrent interest can be enumerated—diseases of the cornea[5], intraocular inflammation[6], sarcoma of the choroid[7], changes in the optic disc[8]. Again and again he comes back to one or another of these major problems, each time adding further construction upon the foundations which he had previously built. His interest in these fields dates from his earliest years.

This return to problems of long continued interest was not conditioned upon any lack of completeness in the first studies, for each of Fuchs's writings has a painstaking and meticulous completeness in itself. Indeed the amount of material which he has condensed in each of his numerous publications is almost unbelievable. Thus his first paper on exogenous intraocular inflammatory disease is an analysis of two hundred cases of penetrating wounds of the eye, including thirty-five that were sympathogenic, and fourteen which caused sympathetic irritation. It was on the basis of this study that he was able clearly to define sympathetic ophthalmia as a disease entity, specific in its histological and clinical characteristics. His first two works on sarcoma of the choroid include reports of first twenty-two and then one hundred and fifty cases, which enabled him

to describe the whole gamut of variations seen in this condition. The time and labor required for these many studies are all the more remarkable when one remembers that at the same time Fuchs was engaged actively in teaching, and in directing large clinical institutes.

To all of these studies he brought his intense clinical interest, and the Leitmotif of all of his pathological researches was the discovery of the morphological basis of disease. Pathogenesis and etiology interested him less, and he never allowed himself to be seduced into the more romantic field of experimental research, yet it is upon the firm foundation of his morphological studies that the modern edifice of experimental investigation is being raised. Future generations will remember him for these great accomplishments, but for those of the present generation who have benefited by his great kindness and wisdom the greatness of the man transcends even that of his works.

1212 Eutaw place.

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A STATISTICAL ANALYSIS OF OPHTHALMIC PATIENTS

HARRY S. GRADLE, M.D., F.A.C.S.
CHICAGO

A practitioner who carefully examines each of his cases and who methodically records every detail of interest will accumulate, over a period of years, a wealth of material for study. Dependable conclusions may be confidently drawn when the experiences of each year are consistent with the experiences of other years. Conclusions are drawn as to the material included in this paper. The final conclusion emphasizes the inadvisability of eye examinations by persons lacking the proper expert knowledge. Read before the Michigan State Medical Society, September 16, 1930.

In the routine of a busy practice or clinic it is almost impossible to conduct a survey of work that has been done, because the details of cases on hand obscure the memory for the details of cases seen last week or last month. But it is worth one's time to make a survey of case records over an extended period of time to analyze the character of work presented, estimate the number of errors made, and find where mistakes have occurred. With these points in mind, I started, some six years ago, a critical study of cases seen in private practice and I immediately found numerous problems.

It was found necessary to limit the study to so-called new cases; that is, cases that came to the office for the first time regardless of whether they had been under treatment elsewhere. It was also found that a critical study extending over more than one year included too much material; a hasty analysis of succeeding years showed that percentages varied immaterially. Therefore the critical study was limited to 1923, and gross comparisons were made for the following six years.

The study embraced patients seen in an average metropolitan practice and who were nearly all city dwellers. The ages ranged from the new-born babe to 94 years; 49.33 percent were males and 50.67 percent were females. The percentage of foreign born patients was comparatively low.

An endeavor was made to have each patient state the nature of his complaint in his own phraseology. It was found that the complaints could be classified into twenty-nine groups. Many patients had more than one complaint, and by comparing the number of patients with the number of complaints it was found that each patient had 1.36 complaints. The following table gives the individual percentages in the total number of complaints, but not the total number of patients:

	Percent
Headaches	13.48
Poor vision	8.86
Symptoms referable to conjunctivitis	8.79
Foreign body on conjunctiva or cornea	8.19
Wish new glasses for no definite reason	7.54
Pain in eyes	5.69
Redness of eyes	5.62
Receding near point	4.06
Eyes tiring on use	3.90
General ocular discomfort	3.27
Chalazion or hordeolum	3.23
Cross eyes	2.60
Burning or smarting sensation in eyes	2.52
Blurred vision	2.52
Injury	2.29
Foreign body sensation without foreign body	2.20
Tearing	2.18
Decreasing vision	2.02
Itching of eyelids	1.94
Dizziness	1.53
Spots before eyes	1.46
Twitching of eyelids	1.22
Eye strain	1.12
Photophobia	0.90
For examination of eyes	0.94
Diplopia	0.80
Blepharospasm	0.68
Eyes swollen	0.23
Various postoperative conditions	0.16
Total	100.00

This list of complaints can be classified into six main groups as follows:

	Percent
Symptoms referable to disturbances of vision	25.75
Asthenopic symptoms, such as headache, et cetera	23.04
Symptoms referable to conjunctival disease	22.65
Foreign bodies and injuries	10.48
Symptoms referable to muscular disease	3.40
Miscellaneous symptoms	15.68
Total	100.00

Although symptoms referable to disturbances of vision form the largest group, the most frequent single symptom is headache. It is impossible to tell accurately whether headache is of ocular origin; it is equally impossible to determine whether ocular treatments relieve headache, because patients habitually fail to return and report upon their condition, more particularly when the symptom in question disappears. But, after considering all of the factors of refraction, muscle balance, ocular pathology, et cetera, it was estimated that there was a probable ocular cause of headache in only 40.66 percent of the patients who came complaining of that symptom. In other words, less than half of the patients who come to the oculist complaining of headache have a purely ocular condition that is the underlying cause of the complaint.

Numerically the third most important group of complaints were referable to some form of conjunctivitis. Possibly this is due to the fact that in a large city there is a great amount of smoke and dirt in the air, and that people are brought into more intimate contact with one another than in smaller cities or in the country. It is certain that simple catarrhal conjunctivitis, regardless of the etiology, plays an important rôle in ophthalmology in a large city.

When all has been said and done, and the last rare disease has been catalogued in its proper place, the fact remains that the bulk of any oculist's work, either in private practice or in a clinic, is refraction. The case may be primarily one for refraction, or a refraction may be performed after existing pathology has been corrected; at some time or other during the course of a case, a refraction is usually performed. Of the cases seen in 1923, 69.2 percent were refracted. Inasmuch as a patient goes to an oculist for a scientific examination of the eyes, it is only natural that a large percentage of cases should be refracted under cycloplegia; of the above number, 70.7 percent were examined under atropine, homatropine or euphthalmine. In every instance, except in young children, a postcycloplegic examination was made.

In tabulating statistics on refraction, it is necessary to consider individual eyes rather than individual patients, for in many instances there may be a marked anisometropia or a patient may have only one eye. Furthermore, statistical attention is paid only to spherical refraction and not to astigmatic, for in the majority of cases at least one

quarter of a diopter of astigmatism was found. Aphakia is classed under hyperopia. The following table contains a general analysis of the refractive errors found:

	Percent
Hyperopic eyes with or without hyperopic astigmatism	57.43
Myopic eyes with or without myopic astigmatism	22.59
Eyes with mixed astigmatism	6.08
Emmetropic eyes (+ 0.25 sph. or less under cycloplegia)	13.90
Total	100.00

Surprising is the large number of emmetropic eyes, which included all eyes that under cycloplegia had a refractive error of +0.25 sphere or less. It was found that 70.11 percent of the cases with emmetropia complained of headache or some form of ocular asthenopia, and the refraction under cycloplegia was performed in the search for the underlying cause. The remainder of the emmetropic eyes were refracted because of complaints of varying character. It is unfortunate that such a large number of patients had to be inconvenienced by an examination under cycloplegia without relieving the complaint, but only by such an examination can the possible ocular origin of the complaint be excluded.

Most interesting figures resulted from a study of the diseased conditions found. Each case was examined carefully and all abnormalities and deviations from the normal were noted. In many instances two, three, or as many as five pathological conditions were found in one patient, while in other instances no pathology could be demonstrated.

By comparing the total number of pathological diagnoses with the total number of patients, it was found that there was one pathological condition for every 1.48 patients. In other words, two of every three patients had some diseased condition of the eye or adnexa. This ratio has remained fairly constant over the six year period. In 1923 there was 1 pathological condition to 1.37 patients; in 1924, 1 to 1.49; in 1925, 1 to 1.45; in 1926, 1 to 1.57; in 1927, 1 to 1.42; and in 1928, 1 to 1.51. The average was 1 to 1.48.

The total number of patients exceeded the total number of pathological conditions by the ratio of 1.48 to 1. Therefore it was deemed proper to estimate the percentage of pathological conditions upon the total number of diagnoses, not upon the total number of patients, and the percentages in the following table are upon that basis:

	Average percent in 1923	Average percent over 6 yrs.
Conjunctivitis, except trachoma	39.3	38.57
Cataract	9.4	11.09
Strabismus	6.9	7.49
Choroiditis	5.3	4.59
Hordeolum	4.5	3.30
Blepharitis	3.3	2.65
Chalazion	3.1	3.30
Retinal sclerosis of marked degree	3.0	2.51
Corneal scars and anomalies	2.9	2.73
Retinitis	2.6	3.31
Disease of tear passages	2.3	1.94
Keratitis	2.3	1.20
Foreign body in cornea.	2.1	3.03
Optic nerve disease	2.0	1.64
Vitreous opacities	1.5	0.87
Ulcer of cornea	1.3	1.96
Iritis and iridocyclitis	1.3	1.34
Paralysis of extraocular muscles	1.3	0.87
Scleritis and episcleritis	1.1	0.74
Injuries	1.0	1.41
Glaucoma	0.9	2.17
Trachoma	0.9	0.48
Tumors and cysts	0.4	0.65
Ptosis	0.4	0.33
Deformities of lids	0.3	0.33
Detachment of the retina	0.2	0.52
Cyclitis	0.2	0.64
Pterygium	0.1	0.31
Cellulitis	0.1	
Total	100.00	100.00

The greatest increase found has been in cataract and glaucoma. It does not seem probable that there is an actual increase in the percentage frequency of cataract; there are several explanations for the apparent increase, and all of them are more or less hypothetical. There has been a very definite increase in the percentage frequency of glaucoma in this series of cases. It is

interesting to note that in 1923 glaucoma formed 0.91 percent of the pathological conditions seen, while in 1928 it formed 2.99 percent, an increase of 2.08 percent. In these series simple or compensated glaucoma occurred in the ratio of 12:1, as compared to the uncompensated or inflammatory type of glaucoma.

The following conclusions from this study seem to be justified:

1. Approximately one-fourth of the patients that come to an eye physician complain of some disturbance of vision; another fourth have asthenopic symptoms that may or may not be of ocular origin; a third fourth have symptoms referable to some disease of the conjunctiva; and the final fourth have complaints that must be classed as miscellaneous.

2. The greatest single cause for complaint is headache, but less than half of the eye patients with that symptom have an ocular cause for the headache.

3. One-seventh of the cases that were refracted showed practical emmetropia. In the remaining six-sevenths, the ratio of mixed astigmatism, myopia, and hyperopia was approximately 1 : 4 : 10.

4. The percentage of pathological conditions found does not vary much from year to year when considered over a period of several years. This percentage will vary with individual examiners and their individual methods, with the character of the practice or clinic, and with the locality.

5. The total number of diseased conditions found is high in the ratio of 1:1.48, when compared with the total number of patients. Two of every three patients showed some pathological condition; a fact which emphasizes the inadvisability of examination of the eyes by individuals not medically trained in the recognition of ophthalmic disease.

58 East Washington street.

THE PREVENTION OF MYOPIA

De Wayne Hallett, M.D., F.A.C.S.
NEW YORK

Etiological theories are briefly grouped with a more lengthy quotation of that of F. A. Newman, who holds that there is an interference with the nutrition of the internal elastic membrane of the eye due to heredity, prenatal malnutrition, improper foods in infancy and too much close work. Reference is made to the researches of Rosenow which suggest that ocular disease is due to a localization of organisms or their toxins from a foreign focus. Evidence is offered that paranasal sinusitis may be a prominent cause, and favorable comment is made on the benefits of the use of atropin in the eyes of juvenile myopes during the summer season. Read before the Homeopathic Medical Society, State of New York, April 22, 1930.

Many observers in the field of ophthalmology have written about the prevention of myopia, and have given great attention to the determination of its etiology in an effort to prevent children from acquiring it. Contributions since about sixty years ago have been made by such distinguished men as Donders, Jaeger, Stellwag, Dobrowolsky, Schiess, Koster, Derby, and Pollock.

Myopia has been ascribed to overaccommodation, to pressure of the extrinsic muscles upon the globe, to increased intraocular pressure from vascular congestion due to posture, and to congestion of the fundus.

It has been treated by using the artificial leech, by prolonged seclusion in the dark room, and prolonged use of atropin. Myopia has been observed to be occasionally present in aboriginal people who did no close work, and to show a moderate hereditary relationship, but it is admittedly a product of civilization and is often acquired during the school years of early life by individuals manifesting no hereditary predis-

position, who are born emmetropic or even hypermetropic.

Undoubtedly the myopias commencing in early childhood are favorably influenced by the prolonged use of atropin. This was the treatment given by Dobrowolsky, Schiess, Hasket Derby, Koster and Pollock, more or less combined with cessation of near work.

Pollock (Glasgow Medical Journal, 1916) organized a special class for myopes in Glasgow which functioned for six years under his direction. These children were treated with atropin for months at a time, and his conclusions were that the suspension of accommodation over considerable periods of time was beneficial, in some cases arresting or even curing low degrees of myopia. He measured the amount of myopia after one week of atropin.

Some new thought on this subject is contained in an article by F. A. Newman (American Journal of Ophthalmology, 1929) who describes the act of accommodation; points out that the fixed attachment of the ciliary muscle is in the region of Schlemm's canal; and states that the muscle has circular, radial and meridional fibers, and that in accommodation these fibers are in tension. Such tension makes the choroid tense; since the choroid has firm attachments only at the optic nerve entrance, at the points of exits of the venæ vorticosæ, and at the entrance of the ciliary vessels and nerves, the effect of this tension of the choroid is to compress the vitreous.

Newman also calls attention to the elastic membrane lining the inner surface of the cornea and covering the pectinate ligaments, and to its being continuous with a similar membrane of the choroid.

This elastic membrane lines the interior of the eye, and reinforces the cornea and the sclerotic in the same manner as the elastic lamina of an artery reinforces its external coats. Newman instances the primary changes in aneurism as related to an interference with the nutrition of the elastic lining. The primary changes of myopia, he suggests, are in like manner related to an interference with the nutrition of the elastic lining of the eye; that the bulging of the sclerotic is secondary, and that so long as this elastic lamina is healthy, myopia will not develop. Newman's dictum is that, as in aneurism, once the elastic tissue is stretched its nutrition is interfered with, and it is then unable to withstand the normal intraocular pressure and tends to stretch more and more.

This lack of a healthy elastic lamina is due, then, to its being stretched. But he amplifies this for the child who uses his eyes too hard, too long, and at too close range by supposing that there may be a congenital or acquired weakness of the elastic membranes within the eye due to heredity, prenatal malnutrition or improper foods in infancy, thus laying down a vicious circle.

Newman, therefore, advocates attention to the health of the pregnant mother and the infant, regulation of the growing child's habits, more country life, more physical exercise, and a reduction of home lessons. In juvenile myopia he has atropin instilled into the eyes daily for periods of two months.

His thesis is most interesting but perhaps there are still other important factors, of which the writer would include the effect of toxins or bacterial organisms from a focal infection such as those of the paranasal sinuses. I have observed many of my youthful myopes to be suffering from nasal sinusitis.

W. Koster (abstract in Journal American Medical Association, 1916) says that the cause of school myopia is an extremely mild, very often inherited chorioretinitis, and that the underlying pathologic condition requires treatment. This treatment consists usually of salicylates, mercury, iodides, or iron, all in minute doses, but over long periods of time.

In support of this element in the etiology of myopia let us note the observations of a number of writers. The slit-lamp has brought to us certain signs of infection in the anterior portion of the eye which were not evident before. It is more convincing to visualize toxins or bacterial organisms as an

etiological factor in the exudates and central areas of degeneration present in progressive myopia than to ascribe the myopia wholly to a stretching of the elastic lamina of the retina.

De Schweinitz says that "among the causes invoked to explain the elongation of the eyeball are the following: a sclerochoroiditis induced by habits of life which promote fullness of the veins of the head and neck and hinder the egress of blood from the eye, excessive study, bad ocular hygiene, imperfect illumination, general or local vascular congestion, and the result of constitutional disturbance". Many of these factors are present when a child has a coryza and more of them in an ethmoiditis.

It is often difficult to distinguish between cause and effect, and Seggel, admitting the presence of sclerochoroiditis posterior, attributes it to myopia.

The pediatricians are frequently finding the etiology of the sick child and infant in the field of the otolaryngologist. Mastoiditis may be present without fever, local pain, redness or swelling. McKim Marriot (American Journal of Otology, Rhinology and Laryngology, September, 1927) says that in children sinus infections are frequent and give rise to a wide variety of symptoms. The frontal sinus has a clinical significance at the age of five, and Killian has operated upon it in a child of fifteen months. I. M. Lupton has found orbital abscesses in young children due to extension of active disease of the ethmoid and frontal sinuses.

A number of authors unite in saying that the child who has reached the age of one year without having had the so-called acute cold does not exist, and they conclude that repeated colds will cause changes in the membranous lining of a sinus or in the bone itself. The ethmoid and maxillary sinuses are present at birth. The frontal sinuses are rarely of clinical importance before the eighth year. Some seventeen years ago Billings showed very conclusively that diseases of the eye could arise from mild, often symptomless, infections of the teeth, tonsils, sinuses, etc.

Rosenow, writing on the subject in 1927 (American Journal of Otology, Rhinology, and Laryngology), says that there is still a difference of opinion as to whether the ocular disease is due to localization of organisms or of their toxins. He conducted a long series of experiments upon animals, making intravenous injections of streptococci isolated from patients. Panophthalmitis was noted five times, conjunctivitis ten times, episcleritis fourteen times, iritis and iridocyclitis nine times, and ulcer of the cornea once. Hemorrhages in the posterior part of the eye, although not often looked for, were found twice. A strain of streptococci that had been passed through nineteen animals produced an iritis (rabbit).

In a patient whose eyesight was well nigh lost from recurrent intraocular hemorrhages, Rosenow obtained cultures from the vital pulp of a decayed tooth; six out of nine rabbits injected with this culture developed lesions of the eye. One had a panophthalmia; in the others, swollen whitish areas and hemorrhages in the retina were demonstrated with the ophthalmoscope and by microscopic examination of sections.

He says in commenting on these that "the experimental results indicate clearly that those lesions of the eye which are associated with exudation even though slight, are usually due to actual localization of microorganisms, while the milder manifestations may sometimes be due to absorption of toxins which are formed in the focus or elsewhere and reach the eye in the blood stream".

Skillern says that, since the lateral wall of the orbit adjoins the ethmoids, and its floor is part of the roof of the maxillary antrum, there is a ready opportunity for congestion, for toxins and pus to reach the eye by way of the ethmoid veins which empty into the superior and sometimes the inferior ophthalmic veins. He says also that there are occasional defects in these bony walls, and that similar relations exist between the sphenoidal sinus and the optic nerve.

Ortmann, Hinsberg and Hajak have

shown by microscopical investigation that the diplococci from infected sinuses infiltrate the bony orbital walls. Kuhnt has discussed the orbital complications from diseased sinuses.

J. I. Dowling says that the nose is an important factor in causing many ocular diseases by contiguity of tissue, by the blood stream, by the lymph channels, and through the influence of the nerves.

Friedrich says: "The arterial anastomosis between the nose and the eye is effected by means of the ethmoid arteries, by branches of the ophthalmic and by a collateral trunk along the lacrimonasal duct which joins the infra-orbital artery. In the same way a communication is established by means of a network of veins between the lacrimal plexus and the veins of the nose, orbit, and face. The lymphatic communication is believed to be intimate."

Practically all oculists point out that in the presence of nasal congestion, and especially in ethmoid disease there is lacrimation, puffiness of the eyelids, conjunctival injection and fatigue of the eyes when reading. These symptoms are the consequences of simple congestion of a transient nature connected with self-limited acute nasal infection.

In recent years there is an increasing appreciation that the nasal catarrhs of children are really the evidence of nasal sinusitis. The point I wish to make is that such nasal congestions are often a feature of the period of life which coincides with the onset of myopia and that the eye participates in all such congestions. If the toxemia of nasal sinusitis causes faulty accommodation, keratitis and uveitis, why not sclerochoroiditis posterior, thus weakening the tissues and permitting them to stretch during the time that the child continues to overuse the eyes?

These thoughts are prompted by the numerous occasions on which myopic children have come for attention when they were likewise harboring a nasal sinusitis. Therefore I believe the oculist should urge the patient to have the attention of the rhinologist in every suspected case.

I also feel sure that the myopia of children is favorably influenced by the daily instillation of atropin for at least two months during the summer season, and particularly in the children under twelve years of age.

We might say that the myopic eye of such a child is overgrown, and that if we put it at rest by means of atropin for such a period, while the body continues to grow and the child lives an outdoor life, the body can in a measure catch up with the eye. My experience in many such cases is that the myopia remains stationary or improves a little from June to September, and that most myopias increase about three quarters of a diopter during the school year. The special value of continued attention to the earliest stages of myopia in the young child should be repeatedly stated to the mother and teacher, and the pediatrist should aid in this education.

274 West Eighty-sixth street.

SOCIETY PROCEEDINGS

Edited by Dr. Lawrence T. Post

SAINT LOUIS OPHTHALMIC SOCIETY

April 25, 1930

Dr. C. W. Tooker, chairman

Ocular disturbances caused by butyn and podophyllum

Dr. Roy E. Mason reported two cases of acute conjunctivitis due to podophyllum powder. In case number one an employee of a drug company was struck in both eyes with podophyllum powder. There was acute hyperemia with extreme redness and pain. The conjunctival sacs were irrigated and cold packs were used. On the second day the lids were badly swollen and the conjunctiva was chemotic with a grayish discharge. Each cornea showed a gray denuded area in a crescentic area on the temporal side which involved about half of the cornea.

The patient was placed in a hospital where mild aseptic solutions, ice packs and atropin were used. The corneal and conjunctival condition cleared in a few days leaving a tiny scar on the temporal side of the right cornea and a more extensive scar inferotemporally on the right eye. There was no loss of visual acuity for distance or near and only a slight contraction of the visual field corresponding to the scar in the left eye.

In case number two the patient, after being struck in both eyes with podophyllum, immediately washed both eyes with cold water. The following day there was slight conjunctival irritation but no corneal involvement. The conjunctivitis cleared up within a few days without complications.

The author also reported his own case of butyn poisoning. The symptoms began with a loss of sensation at the tips of the fingers which was followed by sloughing of the overlying skin and loss of the finger nails. Two weeks later a dermatitis developed on the upper left eyelid, after which an acute inflammation of the conjunctiva and loss of corneal epithelium occurred. The skin condition was diagnosed as a drug irritation and tests were made to determine what drug was responsible. A violent reaction was obtained with butyn and novocaine; on discontinuing the use of these two drugs no further trouble was experienced except once when a solution of butyn was used in the nose.

Nonspecific chronic uveitis

Dr. Harvey D. Lamb read a paper on this subject.

M. L. Green,
Secretary

KANSAS CITY SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

September 18, 1930

Dr. L. Robert Forgrave, president

Thrombosis of the superior ophthalmic vein in acute diabetes with retinal ischemia and total ophthalmoplegia

Dr. Robert James Curdy reported the case of Miss H., aged twenty years, who was a patient in Saint Margaret's hospital with acute diabetes. Eye symptoms appeared three days after admission, and she was under observation until her death four days later.

At the first examination there was slight exophthalmos of the right eye, and complete paralysis of all muscles controlled by the right third and fourth cranial nerves. The externus acted slightly. The drooping upper lid closed the palpebral fissure. There was no swelling of the lids or conjunctiva. The exophthalmos was such as could be caused by the paralysis of the motor nerves without swelling of the tissues of the orbit. The ocular tension was somewhat subnormal. The pupil was dilated and did not respond to light.

The media were normal. The retina was a waxy white throughout the entire visible fundus. The disc had the appearance which occurs with embolism of the central retinal artery, but there was no cherry red spot. The retinal arteries were very narrow and pale and the veins were narrow. The blood stream in the veins was interrupted so that the blood column was broken into short sections; there was no pulsation.

The left eye had slightly subnormal tension and distended retinal veins; it was otherwise normal and had normal vision.

On the next day the right externus was found to be paralyzed, and this made the ophthalmoplegia complete. There was a little swelling of the conjunctiva of the lower fornix. All other conditions remained unchanged. On the fourth day of the observation of eye symptoms there was exfoliation of the corneal epithelium and the cornea was insensitive from involvement of the fifth nerve. The fundus now had the normal red color, but its details could not be seen because of the roughened corneal surface.

There was a slight increase of edema of the ocular conjunctiva. Death occurred during the night of the fourth day. The left eye had shown no change during the period of observation.

Autopsy revealed thrombophlebitis of the cerebral vessels throughout the right frontal lobe with disintegration and breaking down of the brain substance in the base of this lobe, and early meningitis. There was localized thrombosis of the superior ophthalmic vein. This thrombus had pressed the optic nerve upward in its canal. The left optic nerve was normal. The ethmoidal sinuses were infected. The right frontal sinus was congenitally absent.

The ophthalmoscopic picture showed conditions which could be caused only by impairment of the ophthalmic artery. It seemed strange that a thrombus could be so limited in its size and yet have such marked effect on the ophthalmic artery and four cranial nerves. Had the patient lived longer the thrombosis might have extended to the cavernous sinus; the consequent symptoms would have obscured those which were seen. The immediate cause of the cerebral thrombophlebitis might well have been ascribed to the infection of the ethmoidal sinuses.

Discussion: Dr. J. Lichtenberg congratulated the reporter on his fortune in seeing this rare type of case. He had never seen one. One of the rare complications of acute diabetes was lipemia retinalis.

Vitamin deficiency as induced in eye, ear, nose and throat.

Dr. Burt R. Shurley of Detroit, Michigan, by invitation, gave an interesting talk with lantern slides on this subject. He showed that xerophthalmia and keratomalacia were due to a vitamin A deficiency in the rat, chicken, dog and man. Monkeys had not as yet been made to demonstrate this. The cure was codliver oil and diet. He stated that the relationship of vitamin A to lowered resistance was definitely established.

Alvin J. Baer,
Reporter

KANSAS CITY SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

October 7, 1930

Dr. L. R. Forgrave, president

Recession for strabismus

Dr. Conrad C. Berens, of New York City (by invitation) spoke on retroplacement and recession for strabismus. He stated that this operation had originated in Kansas City and had been first performed by Dr. Curdy in 1916, who in doing it had always advanced the opposite muscle an equal amount. In 1922 Jamison had modified this procedure by omitting the advancement of the opposite muscle. The indications for retroplacement operations were as follows:

(1) Age. This operation could be performed on a child three years old, and should be done under general anesthesia. He stressed the point that anesthesia was very important.

(2) Alternating esotropia.

(3) Concomitant esotropia. In this operation the fixing eye should be the one retroplaced, but an explanation should always be given to the family in order to guard against misunderstanding.

(4) Divergence excess without exotropia.

(5) Exotropia. For this condition the muscles should not be retroplaced more than 5.5 mm.

(6) The operation was not indicated in hypertropia or hyperphoria.

(7) Splendid procedure for correction of postoperative exotropia.

The technique consisted in an incision as close to the canthus as possible. After two doubly armed, waxed, number three silk sutures were placed through the conjunctiva, a tenotomy was performed. The distance was then measured from the proximal end of the tendon, and the needles were inserted into the sclera. The usual distance was 4.5 mm. in adults and 3.5 mm. in children. The sutures passed through the sclera, the stump of the muscle, and the conjunctiva. The other suture was a continuous suture and passed out of the semilunar fold. A regular dressing was applied. This was removed in twenty-four hours and iced compresses were applied. Sutures were removed in four days and orthoptic exercises were instituted. One mm. of recession corrected 4.8 prism diopters of squint.

Discussion. Dr. Curdy said that tenotomies failed because of their frequent overcorrection and the inability to judge where the muscle would reattach. Advancement became popular because of its simplicity. When he originated the retroplacement operation he intended it for constant squint only, and performed it with the idea of a resection of the weak muscle and a recession of the overacting antagonist. However, that recession alone was sufficient had been proved by its being performed in a large percentage of cases. Measuring the amount of retroplacement as advocated by Dr. Berens was a real advance.

Alvin J. Baer,
Recorder.

LOS ANGELES COUNTY MEDICAL SOCIETY

Eye and Ear Section
October 7, 1930

Dr. A. Ray Irvine, president

Foreign protein therapy

Dr. B. O. Raulston, professor of medicine in the University of Southern California, presented this paper by invitation. He stated that heavy metals, proteins and other substances produced similar reactions and that the immediate factor in producing a foreign protein reaction was a combination of complex aminoacids. This familiar reaction, with chills and fever, was described as acting most favorably upon certain acute and chronic diseases. He said that the beneficial effect was due to a mobilization of enzymes, a suppression of antiferments, a leukocytosis and an increased permeability of tissue.

In the experimental animal a diuresis with an increase in crystalloid concentration occurred. A diuretic given to such a sensitized animal was from two to six times as effective as in a normal one. This demonstrated the increased permeability of tissues.

Dr. Raulston stated that he was still far from being satisfied with the reasons given him for a diagnosis of a tuberculous infection in certain ocular conditions and their improvement under tuberculin treatment. There had been no large series of cases so treated that was satisfactorily controlled. It seemed to him that the very minute doses of tuberculin used could not possibly have the beneficial effect ascribed to them.

Discussion: Dr. H. Whalman remarked that foreign protein treatment was contraindicated in ocular tuberculosis but valuable in other chronic in-

fections. He had found lactigen more efficacious than aolan in provoking a reaction, but the best method of all was the use of typhoid vaccine as described by Harvey Howard.

DR. WALLACE MILLER said that he had successfully treated a case of retrobulbar neuritis with foreign protein.

DR. EUGENE LEWIS noticed that a patient with retrobulbar neuritis showed improvement after the development of a general respiratory infection accompanied by a febrile reaction. He likened this to a foreign protein shock.

DR. RAULSTON closed by cautioning against the use of foreign protein therapy unless the renal and circulatory organs were in good condition. Foreign protein therapy in the aged usually did not produce very favorable results. Typhoid vaccine had proved most satisfactory to him.

Disciform macular degeneration

DR. M. F. WEYMANN presented a woman seventy years of age who had, over a period of eight months, complained of failing vision in the left eye. The right eye had been damaged by a rheumatic iritis twenty years before. The only pathological change in the left eye was found in the region of the macula where there was present a grayish-white disciform area about two disc diameters in size and rather sharply outlined.

With the binocular ophthalmoscope this disc was seen to lie external to the internal limiting membrane and appeared to consist of new-formed tissue. No pigment disturbance was present but there were some fine hemorrhages on the disc. The general physical examination showed slight hypertension, a slight colitis and a marked arthritis in both knees. The condition was considered to be a disciform degeneration in the macula as described by Junius and Kuhnt. The etiology was probably vascular sclerosis, although the arthritic condition might have had an influence.

Discussion: DR. M. N. BEIGELMAN asked if there was a projection of the disc in the macular region.

DR. WEYMANN replied that there was a thickening of tissue, but no sharp prominence of the disc above its surroundings.

Abstract of Pacific Coast Society meeting.

DR. A. RAY IRVINE presented a résumé of the ophthalmological program of the Pacific Coast Ophthalmological and Otolaryngological Society at the meeting which was held in Victoria in September.

M. F. WEYMANN,
Reporter

CHICAGO OPHTHALMOLOGICAL SOCIETY

October 13, 1930

DR. HARRY S. GRADLE, president

Perforating injury

DR. C. O. SCHNEIDER said that this boy, seven years of age, had been brought into the Illinois Eye and Ear Infirmary following an accident on the Fourth of July, from a torpedo explosion. There had been a wound extending from the center of the cornea to beyond the limbus, with considerable vitreous protruding. A flap operation had been performed and the prolapsed iris had been excised. Following this the tension had been normal, the eye had been at rest, and there had been no further inflammation. About a month later he had returned; the eyeball had become soft and irritable, with a grayish appearance to the lens and some scarring. This eye was dangerous and would be removed.

Congenital absence of eyeball

DR. GEORGE F. SUKER presented an infant seven weeks of age in whom the left eyeball was absent. The orbit was the same size as its mate; the left eye had a socket three-fourths of a centimeter deep, back of which there appeared to be something resembling the sclera. He considered it a case of unilateral cryptophthalmos rather than anophthalmos, as the latter was such

an extreme rarity. His advice was that no operative procedure be done until the child was about twelve years of age, when plastic work could be begun. The eyelids and socket of an infant were too small to permit of successful operation. At the time of the plastic operation sufficient orbital tissue could be obtained to determine microscopically whether or not any vestiges of an eye were present.

Dr. Ida C. Mann (London, England) said that, while she did not consider this a case of cryptophthalmos, it would be impossible to make a definite statement without a microscopic section to see whether there was any ectodermal structure. Even in cases in which there had been no ectoderm from the brain one might find scleroblasts.

Embryology of the eye

Dr. Ida C. Mann of London gave the first lecture in a series of six on this subject.

Robert Von der Heydt,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

October 10, 1930

Mr. Elmore Brewerton, president

Rodent ulcer extending into orbit

Mr. E. Wolff showed a man who had been first seen in June, 1928; at that time he had had an ulcer in the right eye near the inner canthus. This had been treated by means of a surface application of radium for four months. The skin had healed, but the growth had extended back and involved the conjunctiva, and had proceeded to invade the orbit. Mr. Wolff had then excised the growth extensively, but after a few months it had recurred. In July, 1929, he had inserted four radium needles (each one milligram) into the growth, one of them being placed deeply along the lateral wall of the ethmoid. Now, fifteen months later, there seemed to be an entire freedom from growth. It was usually held that when once a rodent ulcer had invaded the conjunctiva, there was but small chance of saving the eye. In these canthus cases it was important to apply the radium to the ethmoid.

Discussion. The President advised members to keep in touch with cases they sent for radium treatment, for a patient of his was told that he was getting better during the applications, whereas at a later stage the orbit had to be exenterated, though originally the growth was only the diameter of the little finger.

Mr. Harrison Butler spoke, on the other hand, of a case in which the growth of similar nature had been confined to the conjunctiva of the lower lid. That patient had had one application of radium at the Radium Institute and the condition was now completely cured.

Entoptic phenomena

Mr. Elmore Brewerton said he had chosen this subject for his address because of its fascination, as we could see most of the phenomena in our own eyes. Patients often asked for an explanation of these phenomena which are due to shadows thrown on to the retina; the ophthalmologist should not only be familiar with them, but should explain them to his students. The term "entoptic phenomena" meant subjective observations of objects within the eyeball. They were shadows thrown on to the retina by objects in the transparent media of the eye of a different refractive index to that of the medium in which they lay. In order to cast shadows it was necessary that they should be opaque. If not opaque, those with a higher refractive index would appear luminous with a dark border, those with a lower index than the medium in which they lay would have a dark center and luminous edges. Before the advent of the ophthalmoscope they were considered to be of great importance.

Methods of demonstrating the shadows included looking at the bright sky, at the illuminated field of a microscope,

at a bright reflected bead of light, at an artificial light with the lids nearly closed, at the sky, or at a light through a minute pinhole. Retinal vessels threw shadows if a light entered the eye through the sclerotic. The shadows coming from the cornea were not really entoptic, as they did not originate in the eyeball; he dealt with those later.

The shadows from the lens were best seen by looking at a light through a hole 0.1 mm. in diameter. The apparent size of the illuminated area seen depended on the size of the observer's pupil. The edge of the illuminated area showed innumerable bright projections extending outwards for a very short distance, but these were seen only if the hole was sufficiently minute; probably this phenomenon was an optical effect and had nothing to do with the eye. In this illuminated area very clear-cut details could be seen. Any dots or striæ in the lens, if they invaded the pupillary area, appeared as dark but transparent striæ; congenital dots and the physiological lens sector lines appeared bright with dark borders, as their refractive indices were higher than the rest of the lens.

Most of one's trouble with patients who complained of entoptic shadows arose from these shadows thrown by strands in the vitreous. It was surprising how little noticed were gross vitreous opacities. They caused blurred vision which came and went, but the opacities were not focussed as sharply defined strands, whereas the so-called "muscæ volitantes" appeared as bright, beaded, curly bands, dark against the sky and transparent against a bright light. These could be demonstrated by looking at a bright light with the lids nearly closed.

With regard to the retina, if in a darkened room a light is focused on the sclerotic one can see an inverted picture of one's retinal vessels. The eye must be turned toward the nose and the light focused on the outer side; a slight continuous up-and-down movement should be given to the light. The vessels were seen clearly, but only in the macular region and for about two disc diameters around the fovea. The disc itself was just out of focus. The vessels appeared as dark, branching streaks on a red field. It was impossible to differentiate between arteries and veins. The fovea and the vessels near it formed a brilliant picture, and he believed that the vessels surrounding the fovea could be traced more easily and accurately subjectively than by any ophthalmoscope.

Theoretically, the entoptic appearance of the macular region should be of value in an observant patient in determining early and advancing macular changes. After an upward iridectomy many patients complained of lines of light radiating downwards from any bright light. It was due to the moist margin of the upper lid bending some of the rays upward through the coloboma; a patient with ptosis suffered in a similar manner. Colored rings usually originated from the cornea; they might be transient and due to mucus on the surface of the cornea, though in rare cases they might be permanent. They were always present in glaucoma if the cornea was hazy. Some people saw faint colored rings whenever they looked at a light. He thought the hazy cornea was due to tension of the stroma fibers, producing minute separations between adjacent fibers and acting like a diffraction grating. The haze instantly disappeared when the pressure was reduced.

He said his reason for bringing this subject forward was that as instruments for examining the eye became more elaborate there was apt to be a neglect of simple methods. An intelligent patient, aware that he was suffering from early cataract, who was undergoing treatment intended to cause the absorption of the opacities, could make a careful monthly drawing of what he saw and could note any change which took place.

The detection of color-blindness from a practical point of view

Dr. F. W. Edridge-Green said that the two essentials of a practical test

for color-blindness were that dangerously color-blind persons only should be rejected by it, and that no dangerously color-blind person should escape detection. The wool test with five test colors allowed fifty percent of the dangerously color-blind to escape detection, and of those rejected by it fifty percent were practically normal-sighted. Most of the other color vision tests were just as defective or worse.

The three most dangerous groups of color-blind persons were the dichromic (who saw two colors in the spectrum), the trichromic (who saw three colors in it and had no yellow sensation), and those who had considerable shortening of the red end of the spectrum. An examination of one of each of these groups would definitely show the value of color names. A dichromic regarded a certain green as white, and a corresponding purple also as white. When shown these colors, why should he call them anything except the white which he saw? If the green were made yellower he would immediately call it green. Those with shortening of the red end of the spectrum might be shown a red light which they did not see at all. They might be shown a pink which appeared to them a definite blue, as indeed it did to a normal-sighted person when examined through a blue-green glass. Color-blind people named colors in accordance with their color perception.

The pseudoisochromatic tests in common use were those of Stilling and Ishihara, and Mr. Edridge-Green's card test. In order to ascertain the relative merits of these three tests, fifty consecutive cases (referred or appeal) were examined at the Board of Trade, with the following results. Each candidate was first examined by the pseudoisochromatic tests; the fact whether he was dangerously color-blind or not was ascertained subsequently. Seventeen of the fifty cases were passed, thirty-three rejected. Of the thirty-three who failed, nineteen failed with all three pseudoisochromatic tests, but fourteen of those rejected passed the Ishihara test completely, and thirteen passed the Stilling test. Of those who failed, all were rejected by the Edridge-Green card test.

Nagel's anomaloscope was not a satisfactory test, since a man might be anomalous without being color-blind, and ninety percent of color-blind people agreed with the normal equation.

(Reported by H. Dickinson.)

THE COLORADO OPHTHALMOLOGICAL SOCIETY

October 11, 1930

DR. JAMES J. PATTEE presiding

Self-limited glaucoma?

DR. G. H. STINE presented Mr. J. S., aged sixty-eight years, who had been first examined by an oculist in 1926 because of blurred vision in the left eye. The form field had been contracted to within fifteen degrees of the point of fixation in the left eye, it had also been contracted in the right eye but to what extent had not been tabulated. The tension had been 24 mm. in the right eye and 47 mm. in the left (Schiøtz). The patient had been put on one percent pilocarpin solution. This treatment was reported to have restored the form fields to normal, with a slight contraction of the field for red in the left eye.

Dr. Stine had first seen this patient a year previously, at which time there was a complaint of some sandiness and irritation of the lid margins at night. The patient was using miotics faithfully. These symptoms were relieved by correction of the refraction, which showed a considerable change. The vision with correction in each eye was 1.6.

The pupils were equal, being contracted to 1.5 mm., and reacting normally. The tension with Gradle-Schiøtz tonometer was 17 mm. in the right eye and 20 mm. in the left. Ophthalmoscopic examination showed the media to be clear. The discs were round: the margins were well-defined but dipped sharply, there being an overhanging upper margin and upward

slant of the excavation. The lamina cribrosa was well defined. It was difficult to decide whether this was incipient glaucomatous cupping or an exaggerated physiological excavation. The fields taken at 33 cm., under seven foot candles of illumination, showed the form fields for 0.5 degree test object to be normal. The color fields with one-half degree test object showed moderate concentric contraction for both red and green, slightly more marked in the left eye. Central field studies with one-fourth degree form revealed no scotoma; the blind spots were slightly enlarged in both eyes.

The patient was seen again in November, 1929, when the tension was 14 mm. Hg in each eye. There had been no recurrence of symptoms. He had been using 0.5 percent pilocarpin in each eye at night. In February, 1930, the tension was still normal, all signs of asthenopia had disappeared, and the vision had remained the same. In August of this year the patient returned again for observation. He complained of no symptoms, the tension was 18 mm. in each eye. The central vision was the same. He was advised to stop the pilocarpin but to continue manual massage of the eyes.

Up to the present there had been no rise of tension, the eyes had felt perfectly well, and the vision had remained good. His pupils were naturally contracted. There had been no change in the fundus picture. The fields for form and colors were within the normal limits in each eye, although the red and green fields in the left eye were slightly smaller than in the right. Central field studies showed slight enlargement of the nasal margins in each blind spot. No scotomata were found.

Discussion. Dr. William M. Bane thought that the fundi in the case were normal in all respects and that the excavations on the discs were physiologic.

Dr. D. H. O'Rourke thought that if the form field had been reduced to within fifteen degrees of the point of fixation and had remained so for any considerable time it would be impossible for regeneration of nerve fibers to occur to the extent that the field was now full. Such a condition could obtain unquestionably in an acute glaucoma, but was unlikely in the chronic simple type. In the study of these cases he referred to the work of Dr. Henry Haden, who had made routine tonometric measurements and had published a table of normal tonometric averages. That such studies were helpful in the early recognition of glaucoma simplex seemed certain.

Dr. Guy Hopkins stated that he had seen the fields in a case of glaucoma (the type not stated) improve very remarkably after an iridectomy.

Trachoma?

Dr. Stine also presented V. J., aged eight years, whom he first saw in July, 1930. The complaint at that time was some discomfort in both eyes, agglutination of the lids in the morning, and some secretion during the day. There was no itching or photophobia. The condition was first noticed in the spring.

The findings were numerous irregular follicles in the lower fornix and on the lower tarsus, and a few in the upper retrotarsal fold, which showed considerable hypertrophy and congestion of the conjunctiva. There were a few follicles on the upper edge of the upper tarsus of each eye. A few larger follicles were also present on the caruncle and semilunar fold. With the slit-lamp incipient pannus was made out at the upper limbus of both corneæ. The case was watched and treated with two percent silver nitrate and later with five percent copper sulphate and glycerin. Owing to comparative freedom from involvement of the upper tarsus the differential diagnosis between follicular conjunctivitis and follicular trachoma was not easy.

A month later the mother, father, younger brother, and baby sister were examined. A similar condition was found in the eyes of the mother and brother, but not nearly so marked. The eyes of the father and the baby were normal. In the mother and the brother the follicles were more evenly distributed on both fornices. The follicles on the semilunar fold and caruncle were large, irregular, and succulent in ap-

pearance. These findings in two other members of the family, especially the mother, favored the diagnosis of trachoma. A combined expression and grattage after the method of McHenry was performed on the mother and daughter, with excellent results in the mother to date, but with a recurrence of a few of the follicles in the daughter. Good results were obtained by copper sulphate in the boy.

The cases were of particular interest owing to the presence of a follicular condition in six younger cousins, which was diagnosed as follicular conjunctivitis by Dr. Marbourg. The two families had been in intimate contact.

Discussion. Dr. William C. Finnoff said that if there was pannus and corneal infiltrate then Dr. Stine's case was probably trachoma. He suggested the name conjunctival granulosis for trachoma until such a time as a definite etiologic factor could be established for either trachoma or folliculosis. Dr. Finnoff further said that pannus was rare in trachoma of young children, but that it would develop if the case remained untreated. He also said that cases of folliculosis would develop pannus.

Dr. D. H. O'Rourke raised the question as to the correct diagnosis in this case. With the hand loupe and a small beam of light no pannus was in evidence and the clinical appearance in his opinion did not resemble trachoma.

Dr. Melville Black described six cases of extreme folliculosis which had a decided lymphoid diathesis. They all cleared up under simple treatment.

Dr. E. R. Neeper thought that the case in hand was unquestionably one of folliculosis.

Cicatricial ectropion

Dr. V. H. Brobeck (by invitation) exhibited Mrs. M. J. H., aged thirty-two years. When five years old the patient had had a large abscess under the right lid extending into the right cheek to the lower border of the nose. The abscess had been incised by her physician.

On Dr. Brobeck's first examination it was seen that the right lower lid had been drawn downward and outward. This condition had been present for twenty-seven years. There was great thickening of the everted conjunctival surface and marked facial disfigurement. The everted conjunctiva measured about 7 mm. from the fornix to the lid margin. Below, a large scar was evident, irregularly stellate in shape, with its center about three-fourths of an inch below the right orbital rim with a thin band running upward, attached to the tissue of the right lower lid. There was a linear scar on the skin following concentrically along the lid line about 1 cm. below the margin. On March 21, 1930, an operation was performed. An incision was made, curving 3 cm. below the right lower lid; this upper flap was undermined and the scar tissue was removed almost to the ciliary margin. The base of the wound was dissected free of cicatrix as far down as deemed advisable. The upper flap, consisting of the free lower lid, was approximated to the upper lid with three sutures fixed to the brow with adhesive. A Thiersch graft was cut from the inner aspect of the right thigh and fitted into the wound. This graft was trimmed and the edges approximated into the wound. Parowax gauze was used to cover the graft. This was removed on the sixth day. The lower border of the graft was found to be slightly invaginated and unattached. This part of the wound, however, granulated from below. The cosmetic and functional result was satisfactory at this time.

Discussion. It was agreed by the membership that Dr. Brobeck had obtained a most satisfactory result.

Hobnail lens, retinitis pigmentosa

Dr. Brobeck also showed Mrs. J. M., aged seventy years. She had had poor vision for thirty years, but for the past fifteen years it had been distinctly worse, especially in the left eye. There had been no eye trouble in the rest of the family relevant to this condition. Vision O.D. was 6/60; O.S. was 1/50; the pupils reacted directly and consensually. The anterior segment was normal except for a few senile changes in the conjunctiva and an arcus senilis

of the cornea. The iris (O.D.) had three tags of tissue running from the pupillary margin to the lens capsule at the two, six and ten o'clock positions. Wassermann reaction was negative; blood pressure 130/90. The heart was negative and there were no adventitious breath sounds. The urine showed a trace of albumin but no casts. In both eyes there were numerous, regularly distributed opacities in the lens substance. With the slit-lamp these were seen as clear elevations on the surface of the adult nucleus. Butler called these hobnail lenses. These might be due to nutritional disturbances. No posterior or other lens opacities were noted.

In the right eye the disc was vertical, of good color, with margins distinct, but the vessels were contracted and tortuous. Clumps of pigment in the periphery resembled the bone corpuscle type of retinitis pigmentosa. There was a large patch of choroidal atrophy in the lower nasal quadrant that might be due to an inflammatory process. In the macula were small pigment changes that were ill defined. In the left eye the disc was atrophic, and a dirty yellow. The vessels were contracted and the choroid was exposed in most parts of the fundus, showing a sclerosis of high degree. Pigmentary changes were even more markedly distributed in the periphery of this eye.

Discussion. Dr. E. R. Neeper recalled a similar case examined a number of years ago. Two years after the first examination the patient's sight was better and a few years later no evidence of the former trouble was observable.

Dr. Brobeck, in closing, stated that in a discussion with Dr. Ida Mann concerning this case she had ventured the opinion that the hobnail lens represented a nutritional disturbance probably dependent upon marked retinal changes.

Coronary cataract

Dr. David Strickler showed Mr. M. C., aged thirty years, a Spanish miner. When first seen on October 8, 1930 he gave the following history. Two months previously while in a pit repairing an electric controller the switch had been accidentally turned on. This had resulted in an electric flash. His face had been badly burned and he had been "completely blinded" for about two hours. There had been intense pain in the eyes, so much so that he had been unable to sleep for six nights. After the first ten days, vision had improved for a time but later it had become extremely blurred; the poor vision had been attended by frontal headaches in the morning. At this time he had been discharged by the Industrial Commission, upon recommendation of an oculist who had reported that there was no pathology to account for the claimant's defect in vision.

On October eighth, the vision was found to be 20/100 O.U. Pupils were large and inactive. There was marked photophobia with tearing on ophthalmoscopic and slit-lamp examinations. However, coronary cataract in each eye was diagnosed; otherwise the media were clear and the fundi quite normal. Vision with correction was improved to 20/80 O.U.

The case was shown to get an opinion as to whether or not the coronary cataracts were a probable result of the injury, and whether or not the photophobia could be accounted for on any basis other than the injury to the retina. Under careful and frequent watching without the patient's knowledge Dr. Strickler was convinced of the honesty of the patient's statements relative to his symptoms. Better vision than 20/80 had never been possible with any correction.

Discussion. It seemed to be the consensus of opinion that the final report to the Industrial Commission should be withheld for some months, because cataracts due to the electric flash would undoubtedly progress to a greater extent.

Dr. Marbourg cited an occasion where a flash from an arc light had occurred where there were several men at work in a group. Those men wearing glasses were not disturbed, whereas the eyes of a few men as far away as thirty feet

were involved to much the same degree as those near at hand.

Steel in anterior chamber

DR. E. R. NEEPER exhibited Mr. A. D. This patient had been shown to the Society in January, 1928. At that time there was a piece of steel two by four mm. in the anterior chamber resting on the iris in the lower nasal quadrant, well out toward the periphery. The piece of steel had been in the anterior chamber for one month. An attempt at removal by a general physician had failed.

At the present time, November, 1930, the piece of steel occupied the same position. Vision was 20/40 as compared to 20/50 in January, 1928. The pupil reacted normally and the eyes were entirely quiet with no evidence of deposits on the posterior surface of the cornea, or on the anterior lens capsule. The pupil of the involved eye was slightly larger than the other. The piece of steel was somewhat more clearly defined now than in 1928. There was no evidence of siderosis. Dr. Neeper pointed out that the vision in the injured eye had always been the poorer of the two.

In January, 1928, it was the unanimous opinion that the piece of steel should be removed, because it was believed that siderosis would unquestionably develop sooner or later.

Dr. Neeper said that in his experience metallic foreign bodies (iron or steel) in the anterior chamber had less tendency to cause siderosis than those in the posterior chamber or the vitreous body.

Discussion. DR. MELVILLE BLACK described two cases where siderosis had developed following a piece of steel being enmeshed in the iris, in the first instance after a period of two years, and in the second, after a period of three months. He urged, as did DR. WILLIAM C. BANE that the piece of steel in this case be removed. Dr. Bane referred to the work of Dr. Nelson Black in regard to siderosis, published in the transactions of the section of the American Medical Association of 1929.

DR. W. C. FINNOFF referred to a case which had developed siderosis and secondary glaucoma after fourteen years. The eye was enucleated. He referred to a second case where normal vision obtained for seven years, but siderosis developed with the loss of vision. However, after removal of the foreign body the siderosis cleared up in about two years.

DONALD H. O'ROURKE,
Secretary.

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CONSERVATION OF VISION

Interest in the prevention of blindness needs to be stimulated in those whose practice is chiefly or wholly confined to diseases of the eye; and other branches of the medical profession think of it too generally as something in which they have no interest or responsibility. Even school physicians may feel that their duty is fulfilled if they guard the community against epidemics of "children's diseases".

The Jacob Lampert lecture for 1930 was given before the Saint Louis Medical Society and the Saint Louis Society for the Blind by Dr. George E. de Schweinitz, who took for his subject "The heritage of sight; its conservation". Dr. de Schweinitz very properly suggested that in the last half century the prophylaxis of blindness had developed until its advocates might point with reasonable pride to what had been accomplished.

For most of the blindness from ophthalmia neonatorum, the specialist in ophthalmic practice cannot be blamed. But he has a duty to educate those who do attend obstetric cases as to the efficacy of the Credé method of prophylaxis, and to guard them against being misled by claims that various proprietary "silver compounds" are as reliable as silver nitrate.

The influence of education and legislation for the prevention of ophthalmia is shown in the decrease in the number of children who are sent to schools for the blind because they are suffering from the effects of this disease. In 1929, in schools for the blind in Pennsylvania, these children numbered only one-third as many as had applied in 1907.

In 1914, at the Wills Eye Hospital in Philadelphia, there were seventeen cases of ophthalmia neonatorum among 13,840 patients, while in 1929 there was but one case among 21,888 patients. Such an achievement needs to be emphasized, both to preserve faith in an effective method of prophylaxis, and to

stimulate efforts to prevent blindness from other causes.

Trachoma is still an important source of blindness. Its bacterial cause is not yet fully established. But the practical measures for its control have been so well worked out that they should be taught to the health officers and school authorities of the regions in which trachoma is frequent. After Napoleon's campaign in Egypt, a century ago, trachoma was epidemic in many parts of Europe. After the World War, in which laborers suffering from trachoma were brought to France from China, India, and Africa, there was no spread of trachoma; and those who had it went home better than they came. Isolation and treatment of all active trachoma cases has been tested and found effective. However much they cost, they will prove profitable to any state or community. The care of Indians suffering from trachoma might well devolve upon the United States Public Health Service, as suggested by Dr. Wilder and approved by Dr. de Schweinitz.

The blindness caused by cataract, glaucoma, atrophy of the optic nerve, and some other diseases is being reduced; but they still figure too largely in the statistics of blindness. Such conditions are receiving careful study, and we may hope that blindness from them will continue to be reduced. But the general, effective application of what is already known about these conditions would noticeably reduce the frequency of blindness in the immediate future.

Sympathetic ophthalmia might be almost entirely prevented by prompt and skillful care of all cases of injury to the eyeball. For this we need mainly education of the profession and of the public. It must not be forgotten that even slight injuries, as well as common ailments like recurring uveitis, various focal infections, phlyctenular keratitis, and neglected myopia, may ultimately result in blindness; and the possibility of blindness as a complication or sequel should be a conscious incentive to the very best care of every case of ocular disease or injury.

Edward Jackson.

CONFLICTING OPINIONS AS TO IGNIPUNCTURE FOR RETINAL DETACHMENT

The rapid development of interest in the operation of ignipuncture for retinal detachment is clearly indicated by the number of articles in which it has recently been discussed. Among well known writers who have offered their experiences, with a variety of suggestions as to technique and principle, may be mentioned the Swiss originator of the operation, Gonin; his compatriot Vogt (See the American Journal of Ophthalmology, 1930, July, page 628); Lindner and Meller of Vienna; and Van Lint of Brussels.

Gonin and Vogt are entirely satisfied that in most cases retinal detachment is secondary to a tear or hole in the retina, with the passage of vitreous humor between the nerve layers of the retina and its pigment layer. Most other recent writers are more or less impressed with the validity of this opinion, but it is not surprising that there are others who fail to accept the theory.

Van Lint (Archives d'Ophtalmologie, 1930, Volume 47, page 597), after declaring that scleroretinal thermocauterization is the best surgical intervention for the cure of retinal detachment, refuses to admit that the essential feature of the operation is cauterization of the tear. He points out that the operation is applied to some cases in which no tear exists, and that Gonin himself has told of cures in cases in which he did not succeed in closing the tear. In some of these cases Gonin was unable to discover the tear, while in others the tear was so large that he preferred to apply the cautery in the immediate neighborhood of the tear rather than to the tear itself.

The most difficult point in Gonin's technique is the localization of the tear, and Van Lint declares that such localization is relatively useless, and that the result obtained depends not upon the closure of the tear but upon the scleroretinal synechia provoked by cauterization. He is thus satisfied to apply the cautery at the most accessible part of

the detachment. No irrefutable argument has been advanced as proof of the etiological rôle of the retinal tear; while it is an interesting fact that cures have been obtained in cases in which no attempt was made to deal with the tear, as for example after mere treatment by rest in bed.

Rubbrecht, a firm supporter of Gonin's views (Archives d'Ophtalmologie, 1930, volume 47, page 160) admits that the fundamental effect to be desired is an adhesive inflammation which fastens the retina to the choroid. The same effect was formerly aimed at by injection of chemical irritants beneath the conjunctiva, supplemented by simple puncture of the sclera. This is the method still advocated by Sourdille of Nantes (see his son's thesis, "Succès opératoires dans le traitement du décollement rétinien", reviewed in the January, 1931, issue of this Journal) although Van Lint, with almost every other recent writer, is satisfied that to accomplish this thermocauterization is greatly superior to chemical cauterization, since the former can be localized more definitely and its intensity can more easily be controlled.

Badeaux of Montreal (Annales d'Oculistique, 1930, volume 167, page 383) believes that Gonin's operation is best adapted for the more recent cases of detachment, but that Sourdille's plan of scleroretinal incision followed by subconjunctival injection of cyanide of mercury is more satisfactory in cases of long standing.

In operating it is much more simple, Van Lint points out, to have no other objective than cauterization of the sclera and retina. Moreover, those who believe absolutely that the detachment is always due to a tear, even if such a tear cannot be found, have no very logical reason for attempting a blind cauterization when they have been unable to find the tear.

Van Lint does concede, however, that it is useful to determine the location of the tear, and that in the neighborhood of the tear one is likely to obtain the greatest possible effect from cauterization. But he differs from Gonin in attaching much less importance to discovery of the tear than does the Swiss clinician. Gonin's especial merit, according to Van Lint, does not lie in having proved that retinal detachment can be cured by cauterization of the tear, but in having demonstrated that the eyeball will tolerate without harm the introduction of a thermocautery or galvanocautery within the vitreous.

Yet it is well to bear in mind that Vogt's extremely scientific analysis of the problem has led him to declare that every future investigation of the etiology of spontaneous detachment will start from the conclusion that this accident is directly due to a hole in the retina.

W. H. Crisp.

MARQUEZ ON BIASTIGMATISM

The American Journal of Ophthalmology takes pleasure in publishing (on page 164) Professor Marquez's rejoinder to the editorial on his method which appeared in the October issue of this Journal.

The editor regrets that a misstatement as to Tscherning's "supplementary astigmatism" crept into the editorial. However, that mistake does not vitiate the chief contention of the editorial, namely that Professor Marquez introduces unnecessary complication into the investigation of the patient's astigmatic error. It will be seen that Professor Marquez, in spite of his evident and admirable love of precision in refractive work, uses a trial case in which (even as to the lower strengths) intermediate fractions of less than one-fourth diopter are not to be found. He is perhaps also unfamiliar with the remarkable possibilities of Jackson's cross cylinder tests for strength and axis in achieving great refinement of astigmatic measurement. It might further be objected that the clock dial is not the most delicate form of astigmatic chart. (Verhoeff's chart, for example, if used under proper conditions, will give information of a much more precise character.)

Professor Marquez appears to be dis-

tinctly beside the mark in the following statement (see paragraph five of his letter): "On the other hand, nobody as far as I know had drawn attention to the fact that 'the cylindrical effect of the crystalline lens may be arranged otherwise than that of the corneal system', until I did so before the International Congress of Ophthalmology at Naples (1909) where I reported 'the first case of biastigmatism'; for, although various authors . . . had spoken of other astigmatisms different from the corneal, in so doing they had merely said that the second astigmatism . . . increased the first or neutralized it, according to whether it was of the same sign or the contrary."

The English edition of Donders' "Accommodation and refraction of the eye" was published by the New Sydenham Society in 1864. In that volume Professor Marquez will find the subject of biastigmatism discussed at rather considerable length although not under that title. On page 456 of Donders we read: "However, the crystalline lens modifies also regular astigmatism, whether in virtue of the form of its surfaces, or through oblique position. Therefore the regular astigmatism of the whole system corresponds exactly neither in direction nor in degree to the form of the cornea." On page 466 of Donders, the table of results obtained by Hamer, Middleburg, and Donders in fifteen cases is largely devoted to this problem; and those results are summarized in the following statements by Donders on pages 467 and 468: "Hence it now appears that we have no right whatever to consider M_c and M_o" (that is, the maximum of curvature for the cornea and the maximum of curvature for the whole eye) "as coincident. Moreover, apart from the degree of M_c, in reference to M_o, it follows that, in normal astigmatism, the crystalline lens, too, plays a very decided part." . . . "We need now scarcely remark, how far we are from being able, by subtracting the astigmatism found for the cornea from that of the whole eye, both only in the horizontal and vertical directions, to find that of the crystalline lens." To illustrate the character of the findings shown in Donders' table, it may be said that in one subject the estimated direction of maximum corneal curvature was 66 degrees, while the direction of maximum curvature for the dioptric system of the whole eye was 102 degrees; in another case the estimated direction of maximum corneal curvature was 120 degrees, while the direction of maximum curvature for the dioptric system of the whole eye was 90 degrees; and so on. Since Donders' time, as a matter of fact, the existence of what Professor Marquez calls "biastigmatism" has been taken so much as a matter of course that very few writers have thought it necessary to enter into a discussion of the subject. *W. H. Crisp.*

BOOK NOTICES

Section on Ophthalmology, American Medical Association, transactions of 1930 meeting at Detroit. Cloth, 372 pages, 7 color plates, 76 illustrations in text. Chicago, American Medical Association, 1930.

The five months between the holding of the meeting and the issue of this volume will be judged a reasonably prompt interval before publication by those who know something of the details and processes involved in such publications. The scientific papers were all printed in the presession volume for use at the time of the meeting. The copyright page announces that they are here "reprinted from the Journal of the American Medical Association, a copyrighted publication". The copyright prevents the illegitimate use of such papers, garbled or distorted to serve purposes for which they were not intended. But only ten have thus far been published in the Journal of the American Medical Association.

While the substance of each paper has been available to each member of the Section who received and preserved his presession volume, it is convenient to have them in this shape arranged and permanently bound and paged as they will hereafter be referred to. The series of which this is the fortieth volume

was begun in 1891; and few such transactions are of equal value to the ophthalmologist. They furnish a good reason for joining the Section and keeping up one's membership in it.

The address of the chairman of the Section, T. B. Holloway, did not appear in the presession volume. It deals with correlation of university research, and suggests a centralized research laboratory administered by full time research workers, but available for workers from any department of the University. "Such a laboratory should include a moving picture studio available to any department of the university." The discussions of papers presented at the meeting are also new material, the importance of which is easily overlooked. These discussions constitute about one-sixth of the proceedings. The number of papers is twenty, but the discussers numbered seventy, and their remarks are often much condensed on account of the time limit imposed on the speakers. One cannot afford to practice ophthalmology without keeping in touch with this, the largest association in the world, holding annual meetings for scientific discussion of its scientific basis, problems, and methods of practice. *Edward Jackson.*

Collected reprints from the Wilmer Ophthalmological Institute, volume 1, 1925 to 1929 inclusive. Large octavo, illustrated. Baltimore, 1930.

In this volume are collected the proceedings and the addresses at the dedication of the Wilmer Institute, October 15 and 16, 1929; with reprintings of forty-eight papers that have emanated from the Institute in the five years it has been in active operation. Of these papers eight were first published in the bulletin of the Johns Hopkins Hospital, eleven in miscellaneous medical and scientific journals, eight in the transactions of scientific societies in which they were first presented, and twenty-one in three ophthalmological journals, including eleven from the American Journal of Ophthalmology.

The illustrations are abundant. Reproduced photographs of the Institute furnish twenty-four full page illustrations. There is also a portrait group, including (with Professor Wilmer) Professor Fuchs, Sir John Herbert Parsons, and Dr. George E. de Schweinitz, who delivered the scientific addresses at the dedication. All the illustrations are of excellent quality. The whole volume emphasizes the importance of the work which is being done at the Institute, and any one interested in ophthalmology will find the volume of value for the history it records and the exposition of the present state of ophthalmic science. With Professor Fuchs's address are given portraits of nine of the founders of modern ophthalmology and reproductions of older woodcuts.

In the proceedings of dedication, the remarks of President George E. Vincent on the "Perpetuation of personality" and the story of "How the Wilmer Institute was started" by Mrs. Henry Breckenridge contain some of the best thoughts. The latter concludes with this sentence: "The purpose of the Institute is to carry on the philosophy of Dr. Wilmer by treating human beings as human beings, and regarding the eye as the window of the soul." *Edward Jackson.*

Your vision and how to keep it. By H. G. Merrill, M.D., and L. W. Oaks, M.D. Cloth, duodecimo, 145 pages, 13 illustrations. New York and London, G. P. Putnam's Sons. 1930.

The hope of the author is "that the present treatise may be of aid to the reader and to the reader's neighbor in the preservation of God's most precious gift, that of vision." "Doctor" means "teacher", and the doctor of medicine who thinks about it finds that a large part of his time, and his most effective service, is given in teaching patients. As medicine is devoted more and more to the prevention of disease, this teaching becomes more important. Even if the patient comes to you for treatment or operation, the result of

your prescription or operation will depend in the end largely on what he does to keep vision after he recovers it. Upon skill in teaching the conditions required to keep vision and ocular health will depend the end result, the patient's loyalty, and your own professional reputation and reward.

You may have definite ideas about what to say to your patient and how to say it in meeting each demand for help. But to know how someone else meets these demands will help you, by suggesting what you had not thought of, or by provoking critical consideration of the situation to be met from a point of view differing from your own. Learning by the experience of another may be difficult, but it is generally better than to depend upon recognizing your own mistakes. A book of this kind should command the attention of every oculist. When he has read and considered it he can decide which of his patients needs to learn some of the lessons it teaches. Acquaintance with several such books will enlarge his practical resources to wage the struggle against the ignorance of patients, and against their belief that they know all they need to know about their own eyes.

As might be expected, this book, written by men practising in Provo, Utah, a university town, is one that carries its information and appeal to intelligent patients; and such people best recognize and accept the ideas it presents. Others may learn by their example, although some may long remain the victims of their mistakes and false notions about the power of their eyes to do everything that may be required of them, without "artificial" helps. The volume can be read through with advantage by anyone alive to the interest of its lessons. Its six-page table of contents, giving all its paragraph headings, serves the purpose of an index, and helps to find any special topic that is of immediate interest. An unusual feature is that all the illustrations are new, and are not copied from older textbooks. It is a worthy addition to our literature.

Edward Jackson.

Bildersehprobe für die Nähe für Kinder und Analphabeten (Pictorial visual tests for near for children and illiterates). By Professor Dr. W. Löhlein. A group of three near-test cards, in stiff cloth covered case. Price 9.60 marks. J. F. Bergmann, Verlagsbuchhandlung, München.

This is not a book, but a group of three cards in a case. The cards are printed with remarkable distinctness, and furnish pictorial near-vision tests for distances between 15 and 750 centimeters inclusive, and for acuities between 2.0 and 0.04 inclusive. The objects pictorially represented include a bird, a star, a cross, a teacup and saucer, a fir tree, a chair, a candlestick and candle, a watch, a ladder, a key, and a pair of pincers. This card is given in duplicate, except that the second card of this kind has the various images in reversed order; while a third card is made up of the broken ring and Snellen hook (the illiterate E) in various positions and sizes.

The printing of the test images is perfect, and this group of cards can be very cordially recommended as an addition to the equipment for testing visual acuity in children or illiterates.

W. H. Crisp.

The nature of the vitreous body. By W. Stewart Duke-Elder (for the Medical Research Council). British Journal of Ophthalmology monograph supplement 4. 72 pages, illustrated, paper covers. Price not stated. 1930, Geo. Pulman and Sons, Ltd., London.

This monograph, containing much research material (the expenses of the research were met by a grant from the Medical Research Council of Great Britain) such as may ultimately lead to important conclusions of clinical value, is of a highly technical character. It adduces evidence suggesting: (1) that the vitreous body is a hydrophilic elastic gel; (2) that it is formed upon the basis of special protein constituents elaborated by the surrounding ecto-

derm, and that the common intraocular fluid (which is a dialyzate of the capillary blood), percolates these, combining with them physically to form a gel; (3) that the reactions of the vitreous body to changes in its environment and in its internal economy proceed along physicochemical lines according to the conditions which govern the behavior of gels in general.

The zonule is regarded as having a structure similar to that of the vitreous body; the complex system of fibers apparent on histological examination being, like the "fibers" of the vitreous body, artifacts of fixation.

Although the optical appearances found with the slit-lamp have seemed to confirm the findings of histologists as to the existence of a framework or scaffolding in the vitreous, Duke-Elder remarks that the vitreous provides the most striking example of a group of conditions in which the biomicroscopic findings may be frankly misleading unless correlated with facts demonstrated by other methods. Ultramicroscopic examination, it appears, indicates that the vitreous is a true gel without any microscopic structure in the usual sense of the word.

The author indulges in some interesting but inconclusive speculations as to directions in which research on the structure and composition of the vitreous is likely to bear upon clinical advance in the problems of glaucoma and retinal detachment. *W. H. Crisp.*

CORRESPONDENCE

Yes, biastigmatism bobs up again

To the editor:

"Biastigmatism bobs up again" is the title under which Dr. W. H. Crisp, editor of the "American Journal of Ophthalmology" honors me in last October's issue of that Journal by making some comments on my latest study of the subject as published in the April number of "Archivos de Oftalmologia Hispano-Americanos", under the heading of "Concerning the great practical importance of bicylindrical combinations in the diagnosis of refraction", a report which I presented at the International Congress of Ophthalmology held at Amsterdam in 1930.

The comments in question are no doubt the result of an incomplete study of my works, for which reason our distinguished colleague has completely failed to understand the methods I recommended, which, be it said in passing, a large number of refractionists who have been in my clinic are using every day with the greatest success, and are as convinced as I am that by their use they get much more exact results than by the ordinary methods of diagnosing astigmatism.

Dr. Crisp, in the course of a brief account of the question, omits to refer to an important work on the subject: I allude to that written by Dr. Busto and myself, which consists of tables, which are most useful to anyone who understands how to make good use of them, for transforming bicylindrical glasses with oblique axes into spherocylindrical, which avoids the necessity of calculating each separate case, as these calculations are ready to hand beforehand.

The "eccentric feature" of my method does not consist, as Dr. Crisp alleges, "in writing into the patient's prescription the cylinder and axis as shown by the ophthalmometer, and a second cylinder and axis corresponding to the difference between the 'remaining astigmatism' and that found with the ophthalmometer". This last expression is evidently a mistake. The second cylinder is not the said difference but only the remaining astigmatism, i.e., the difference between the total astigmatism and that found with the ophthalmometer. In other words, what we put in the trial frame are the following two cylinders:

(1) the corneal or ophthalmometric;

(2) the noncorneal or 'remaining', that is Tscherning's "supplementary".

This 'heresy', as Dr. Crisp calls it, appears to have been already refuted by Professor Stock at the time of my communication to the International Congress of Medicine held in 1913.

The objections raised by the above-

mentioned distinguished colleague I had already noted before for myself. The most noteworthy of these is that "the effect of two or of any given number of cylindrical glasses can be replaced just as well with a single one having a cylindrical effect", a fact which of course we all knew already, but we did not see why it should be an obstacle to the successive use of the two cylinders as a means of investigation, which thus served for making both the analysis and the synthesis of biastigmatism. On the other hand, nobody as far as I know* had drawn attention to the fact that "the cylindrical effect of the crystalline lens may be arranged otherwise than that of the corneal system", until I did so before the International Congress of Ophthalmology at Naples (1909) where I reported "the first case of biastigmatism", for although various authors (Donders, Knapp, Giraud-Teulon, Russell—of Baltimore—, Tscherning, and Javal) had spoken of other astigmatisms different from the corneal, in so doing they had merely said that the second astigmatism (Tscherning's "supplementary") increased the first or neutralized it, according to whether it was of the same sign or the contrary.

Well now: when I showed in my recent works that it was very advantageous for the investigation of astigmatism to first of all correct the corneal according to the ophthalmometer and then the 'remaining', making use of the clock dial as in the subjective method, I was merely placing on record an obvious clinical fact ascertainable by the humblest practitioner who cares to take the trouble to prove it for himself, and I showed moreover that, by using my method, more complete results were obtained than by using the ordinary ones, seeing that a corneal astigmatism may be almost neutralized by the 'remaining' astigmatism, without the small resultant astigmatism being visible if the subjective method alone is used, as it is disguised by the partial contraction of the ciliary muscle in a certain direction; whilst if we first correct the corneal, leaving the second astigmatism unneutralized, this latter is clearly visible in the subjective method, seeing that, besides being greater than the total, it is not so easy to correct by the contractions of the ciliary muscle, since these must be greater and in an unaccustomed direction, for which reason the inequality of the radii of the clock dial will be more marked, which may thus be rectified by a second cylinder which restores the equality of the said radii. As in Stock's bicylindric lens, wherein all the intermediate cylindrical effects, from zero to the sum of both cylindrical glasses of contrary sign, can be obtained by the rotation of both glasses, the same occurs with the corneal and the 'remaining' astigmatism when, for instance, the first—according to ophthalmometric data—requires for its correction a —1.00 cylinder axis 0° (or 180°, which is the same thing), and the second +1.00 cylinder axis 175°, to equalise the radii, equivalent to —0.17 cylinder axis 42° with +0.08 sphere, a combination which does not exist in the trial case, nor do the opticians make it as a rule; so that in this case the bicylindrical combination would be preferable, and this is what has been done in similar cases several times by opticians in Madrid.

And this is where Dr. Crisp makes his second blunder in attributing to me what I did not say always happens. It is true that "the corneal astigmatism and the lenticular astigmatism can each be represented by the usual exact fractions of dioptric measurement such as 0.25, 0.50, 0.75, 1.00, 1.25 diopter, and that the combinaton of two astigmatisms pertaining to the cornea and crystalline lens respectively can be expressed in a spherocylindrical formula, but that the new formula will express both sphere and cylinder in unusual inconvenient fractions such as 0.17, 0.32 diopter", and it is likewise true that I have stated that "in practice the bicylindric combination will at times be preferable", as we have seen in the example already quoted, and that "on the other hand, the spherocylindric combination will be preferable when it con-

* See editorial, page 160 of this issue.

tains a cylindric component which differs by very few hundreths from the lenses in current use".

But it is quite inexact to say, as Dr. Crisp says, "but these contentions are based upon the extraordinary assumption that the natural fractions of ocular refraction are commonly exact fractions of the metric system as encountered in the trial case". If Dr. Crisp had read my essay in the "Archivos de Oftalmologia Hispano-Americanos" well, he would have noticed the following paragraph: "It must be remembered that there are cases in which this substitution (spherocylindrical) may give even better results than the bicylindrical one from which it is derived; since of course the primitive components of the two astigmatisms (0.75, 1.25, and so on) may not be the exact ones, but rather intermediate fractions, whilst on the other hand the result of the bicylindric combination might be a spherical or a cylindrical which may approach more nearly to those of the customary dioptric values of the lens case."

Again, if Dr. Crisp had read the introduction to our tables he would have run across the following paragraph: "It must be borne in mind that, just as the investigation should nearly always be made by means of the two cylinders, because we often get unexpected approximations and exactnesses, we should afterwards on the other hand endeavor to get single cylinder equivalent by use of the tables, and then test it in the trial frame to see whether it be the better tolerated; and if it is, prescribe it." Further: there are cases wherein, although the single cylinder obtained falls between two of the series usually constructed, if we test the two between whose values it lies in the lens case, we experience the agreeable surprise of discovering that with one of them, the upper or the lower, one sees still better than with the bicylindrical combination. The fact is that in these cases the most correct is not, as in other cases, the resultant, but the upper or the lower; because it must also not be forgotten that in order to get to the bicylindrical combination we started from the values of the cylinders in the trial case, which run by steps of 0.25, and it is possible that the two initial astigmatisms corrected with the cylindrical glasses used were not 0.25, 0.50, and so on, but intermediate fractional values between them which we have not had any need to use.

So that it is apparent that the "extraordinary assumption" is not mine but Dr. Crisp's in asserting that I always start with the supposition that corneal astigmatism and the remaining astigmatism "are commonly exact fractions of the metric system".

I would add further, without however wishing to despise "the common opinion of scientific optical students and practitioners", when they say "there is absolutely no logical basis for the complicated and impractical type of prescription employed by Marquez", that it is I who consider as absolutely worthless the a priori opinions of persons who have never put my methods into practice. I invite them to do so in accordance with the methods laid down by me with the many who have been able to ascertain for themselves in my own clinic the efficaciousness of the method by actually using it, they would be converted into advocates of the same, to the great benefit of their patients.

Let it be understood, in conclusion, that we do not insist on the proper handling in practice of bicylindrical combinations simply as a matter of 'amour propre'. We do so because we are sure beyond the shadow of a doubt that the results are far more precise than those obtained by the ordinary methods. As we said in the work already quoted, "it is not sufficient that optical concerns invent the most perfect glasses, unless the previous diagnosis of the oculist has been as minutely exact as possible". *M. Marquez.*

Madrid, Spain, November 1930.

Professor Ernst Fuchs

To the editor:

The eulogies of the late Professor Ernst Fuchs published in a recent issue of the Journal emphasize not only the great respect in which he was held

by American ophthalmologists, but the enduring affection all his former pupils had for him.

It is with no little pride that I recall a certain Sunday morning in 1878, when the late Dr. David H. Coover of Denver and myself, anxious to see the great Arlt operate at his clinic in Vienna, first came across Fuchs in the hospital. He was quite tall and apparently rather spare in build. Prosperity had not yet marked him for her own. Sensing from our dress and mannerisms that we were Americans, he addressed us in English, and after the usual salutations inquired, in the characteristic kindly way which distinguished him throughout his life, as to what service he might render us. When we replied that we wished to see Professor Arlt operate, he told us that could be readily accomplished since he was Professor Arlt's first assistant. Suiting the action to the word, he escorted us into the operating room and we were afforded a choice view of the master at work.

Shortly afterward Dr. Coover and myself prevailed upon Fuchs to give us, in English, a course of instruction in refraction and ophthalmology in general. It was necessary to make up a class of ten to satisfy the requirements, and in that class were Coöver of Denver, Ryerson of Toronto, Charnley of Shrewsbury, England, Linton Forbes of Belfast, Ireland, Knaggs and Tom Dixon of Australia, Palmer of Toronto, and myself, with two others whose names, for the time, escape my memory. So instructive was the course and so delightful the instructor, that other English-speaking students rapidly embraced the opportunity to repeat the course, and Fuchs's popularity with the embryonal English-speaking ophthalmologists became assured from that moment.

The ophthalmological world has good cause to mourn the passing of Professor Fuchs. His place will be difficult to fill, but his influence will survive through many generations.

L. Webster Fox.

Philadelphia

Dispensing glasses

To the editor:

Let us get down to "brass tacks" in this matter of recurrent worry (mostly by big city confrères, J. Ross Reed the latest) over the ethical status of ophthalmologists who have acquired the habit of dispensing the glasses they would have their patients wear.

I am one of them; although not from choice, as will be manifest when I say that there was not a lens grinder within a hundred miles of me during the first forty years of my work here. It is different now, of course, with the establishment of branch shops by the manufacturing opticians. But there still are, and must continue to be, ophthalmologists remote from these branch shops; and it does not follow that the man so situated cannot thus be as reputable as his more fortunately situated confrère. It does not even follow that I have lost "caste" by adhering to my old custom. On the contrary it is my observation that the men I know who do as I do are quite as much a credit to the profession, ethically and scientifically, as those who condemn dispensing. Incidentally I wonder why nothing has been said about dispensing tubes of ophthalmic unguents. The supposedly "correct" practice outlined as the charging of a (proper) fee for the examination and letting the "qualified" optician do the rest, would be ideal. How we all (even in the small towns) long for that Ultima Thule! But we know that Utopia was given up ages ago as unworkable; and the size of the fee to be charged, together with the trustworthiness of the "qualified" optician, may not be considered as res adjudicata. Thus we have to fall back on the basic truth that "circumstances alter cases".

H. B. Young

Burlington, Iowa

OBITUARY

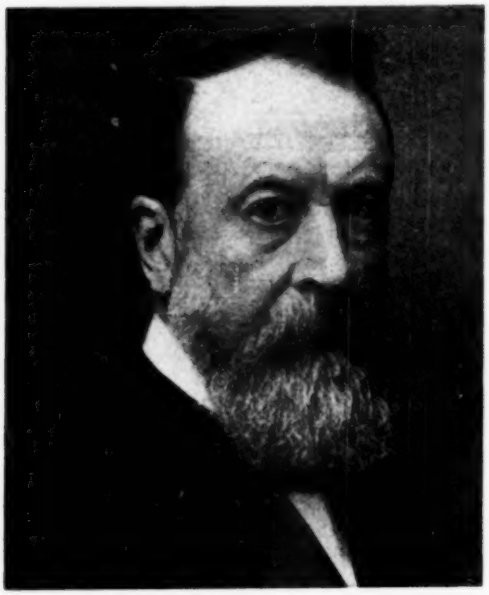
Jean-Baptiste Coppez

(Extracted from an article by Professor Gallemaerts, Annales d'Oculistique, 1930, volume 167, page 985.)

J.-B. Coppez, for many years a leader in the ophthalmologic life of Belgium

(his native country) and of France, recently died at the age of ninety years, after a professional activity of more than sixty years. Belgian ophthalmology was in its infancy when he first took up the specialty.

He was born in 1840 at Rongy, a small Belgian village near the French frontier. He belonged to a family which had included several physicians at the time of Napoleon the first. His father was a miller and intended him for the priesthood. But Jean-Baptiste



J.-B. Coppez, 1840-1930

Coppez also worked for six years as a miller before he entered the University of Brussels.

The capital of Belgium then had no school of ophthalmology, and, after receiving his medical degree, Coppez studied for two years in Paris under such leaders as Desmarres, Liebreich, de Wecker, Galezowski, Sichel, Meyer, and Panas. This was at the end of the Second Empire, and Coppez counted among his distinguished friends many young democrats who subsequently assisted in the overthrow of Napoleon the third. He was intimate with Courbet, Alphonse Daudet, and Gambetta. Of great muscular strength, he achieved some distinction as a wrestler.

After returning to Brussels his success was rapid. The struggle to establish ophthalmology as a distinct specialty led to his appointment in 1876 as chief in internal medicine with authority to open an ophthalmologic clinic at the University of Brussels.

He was an expert, rapid, and clean operator, and in his clinical teaching manifested a remarkable memory for details of cases seen.

In 1883 he took part in the establishment of the French Ophthalmological Society, and he attended the meetings of this society for thirty years. In its bulletin appeared most of his important works. He was especially interested in trachoma, for which he strongly recommended the use of jequirity; he advocated aspiration as the operation of choice for soft cataract; and in 1885 he advised the treatment of detachment of the retina by a modified Wolfe operation, plunging a Graefe knife more than one centimeter through sclerotic, choroid, and retina, and prolonging the incision for eight to twelve millimeters along the meridian of the eyeball. He took part in the formation of the Belgian Ophthalmological Society in 1896, and was its first president; and his last public utterance was an address on sympathetic ophthalmia before this society in 1911.

Jean-Baptiste Coppez's son, Professor Henri Coppez, is a distinguished ophthalmologist, and the two sons of the latter, Jean and Léon, have adopted the same specialty. *W. H. Crisp.*

Erratum

We are asked to state that the second paragraph from the end of the obituary with regard to Dr. David Nichols Dennis which appeared in our January issue should be corrected to read as follows: "He leaves three children by his marriage to the late Mary Camilla Loder Dennis, namely, Dr. Edward Parker Dennis and Mrs. Harrison Dunn of Erie, Pennsylvania, and Miss Camilla Dennis of Boston, Massachusetts. He is also survived by his second wife, Mrs. Maude Morrow Dennis."

ABSTRACT DEPARTMENT

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history

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1. GENERAL METHODS OF DIAGNOSIS.

Margotta, G. **Micrometry of the ocular fundus.** Ann. di Ottal., 1930, v. 58, Aug.-Sept., p. 676.

The desirability of precisely localizing lesions in the eyeground has taken on added importance since Gonin has shown that if the tear in the retina can be definitely located and its exact distance from the limbus determined there is hope of giving relief in retinal detachment. It is also helpful in cases of subretinal cysticercus.

After reviewing the various methods suggested for determining the zone and the special area in the fundus in which the part involved is situated, the author then integrates the method which Lindner has recently proposed in a series of calculations that gives greater exactitude than that afforded by the graphic method. He applies the graduated perimeter arc to the Gullstrand ophthalmoscope; the latter he finds has limitations in scope and he proposes possible modifications to meet this purpose. *Park Lewis.*

Puscariu, Elena. **Iconography of orbitoocular affections with wax models.** Arch. d'Opht., 1930, v. 47, Sept., p. 601, and Oct., p. 694.

This article consists of nineteen plates which are photographic reproductions of wax models of orbitoocular affections such as dacryocystitis, syphilis of the lids, and tumors. Each plate is accompanied by a detailed case report. From the photographs the models would seem to be excellent.

The second series includes case reports and pictures illustrating xeroderma pigmentosum, melanosarcoma, plasmoma, panophthalmia, staphyloma, epibulbar sarcoma, corneal epithelioma, orbital osteoperiostitis, orbital hydatid cyst, orbital myxosarcoma, orbital cavernous hemangioma, and invasion of the orbit by a tumor of the maxillary sinus. *M. F. Weymann.*

Scotti, P. **On the transillumination of the ocular globe.** Ann. di Ottal., 1930, v. 58, July, p. 618.

The various methods and instruments that have been used for diaphanoscopy are fully described. Two methods are employed. The direct method is through the sclera without the interposition of other structures. In the indirect method the light is directed through the mouth, nose, or external tissues. It is of use not only in outlining intraocular tumors, but also in bringing into visibility the borders of the crystalline lens, in indicating pigment deficiencies and changes in the iris tissue, and in showing differences in color and patches in the eye ground. In endocular hemorrhages direct diaphanoscopy will often be a valuable

addition to the clinical and ophthalmoscopic examination. (Bibliography.)
Park Lewis.

2. THERAPEUTICS AND OPERATIONS

Aubaret, **Beginning exercises and new procedures in ophthalmic surgery using two lances.** Arch. d'Opht., 1930, v. 47, Sept., p. 577.

In order to become proficient with the use of a keratome in each hand it is recommended to first use them for tattooing. Later paracentesis may be done with incisions from both sides of the cornea. In irrigation this double incision has the advantage of a point of entry and a point of exit for the fluid. An artificial pupil may be made by introducing an iris forceps through one incision and the de Wecker scissors through the opposite one. Two broad keratomes may be used for cutting off the cornea in the operation of evisceration. Diagrams illustrating these procedures accompany the article.
M. F. Weymann.

Morgan, O. G., and Lees, J. M. **Rectal narcosis in ophthalmic surgery.** Brit. Jour. Ophth., 1930, v. 14, Nov., p. 577.

The authors found rectal narcosis with avertin to be simple in administration, without after effects and with total amnesia for the operation, in spite of some degree of apparent consciousness. The dosage is calculated at the rate of grams per kilo of body weight, in practice working out at between 0.06 and 0.09 gm. per kilo. With the minimum dose all coordinated movements are retained to a greater or lesser degree. Ocular movements can be elicited by persistent command. The upper limit dose was used successfully in operations such as extirpation of the lacrimal sac, plastic work, and enucleations.

One hour before operation 0.25 gr. of morphium may or may not be administered. Half an hour before operation the calculated amount of avertin is given by rectal tube, at a temperature not above 40°C. The solution of avertin should be tested with Congo red to insure against decomposition. The administration should take from five to ten minutes, but it is to be noted that the absorption of the drug is so rapid that no extra dose can be given in the event of a return of the first dose by the patient. In such case the use of avertin must stop for at least four hours. The usual period of narcosis is from one and one-half to two hours. Cyanosis is evident and the blood pressure falls between 10 and 20 mm. Hg. If colitis occurs it is likely due to some decomposition of the avertin. Nephritis is a contraindication. Cataract extraction, acute glaucoma, evisceration, and plastic operations are carried out very satisfactorily. *D. F. Harbridge.*

Sallmann, L. **A simple fixation apparatus for radium holders in ocular radiation.** Klin. M.f. Augenh. 1930, v. 81, Sept., pp. 414-416. The apparatus consists of a head band with two ball-and-socket joints, as in a nasal head mirror, one at the front plate and one on the arm for the radium container, so that this can be moved in all directions. (One illustration.) *C. Zimmermann.*

Salzmann, M. **Iridectomy and lens injury, and its prevention through iridectomia ab externo.** Zeit. f. Augenh., 1930, v. 72, Sept., p. 9.

In order to estimate the frequency of lens injury in cases of iridectomy, Salzmann examined the records on all iridectomies which were performed at the Graz clinic since 1912. He ignored those in which there was aphakia or lens injury after intraocular foreign bodies. Of the remaining 998 iridectomies he excludes those in which leucoma after corneal ulcer had increased the difficulties not only of the technique, but of judging the results. Of the remaining 694 iridectomies, 345 were performed for iridocyclitis and its sequelæ, and 349 for a group comprising primary glaucoma, secondary glaucoma after lens luxation, retinal vein thrombosis, and a few tumors of the iris. The lens was injured in one percent of the first group, and nearly seven percent of the second.

Often the diagnosis of lenticular injury is difficult. Without anatomical examination the statistics would doubtless have been more favorable. Injury with the point of the keratome can be ascribed only to sudden movements of the patient's head or a considerable degree of clumsiness on the part of the operator. Though theoretically desirable, one usually does not remove the traumatic cataract immediately. Usually it is not discovered until some time after the iridectomy, when one hesitates to reoperate the greatly irritated eye. In the eight patients on whom the operation for traumatic cataract was done at Graz, only one attained a modest visual power. In several cases the cataract would not have been discovered clinically at all. It is not necessary that the capsule be ruptured to bring about cataract; mechanical injury of the epithelium can produce local opacity. Summarizing the entire anatomical study, Salzmann finds that in fifty percent of all the eyes that were completely lost after iridectomy there was injury of the lens capsule and formation of cataract. If one adds to this formation the eyes in which there was prolapse of the lens into the wound, then a lens lesion occurred in sixty percent of the eyes lost after iridectomy. Other injuries of the eye are corneal puncture from behind and stripping off of Descemet's membrane as a result of faulty direction of the keratome.

To minimize the dangers of iridectomy Salzmann advocates a technique which he calls iridectomy from without. He makes a curved conjunctival incision six to eight millimeters from the limbus, dissects back the flap, and then with the point of a sharp keratome makes an incision through the sulcus scleræ externus; i.e., one millimeter behind the limbus and concentric with it. One applies the instrument vertically and divides layer after layer of the scleral fibers until the iris protrudes. It is entirely unnecessary to introduce any instrument into the anterior chamber. The incision has the advantage of traversing the ocular wall at a right angle and being truly linear with very slight tendency to gape. The aqueous escapes slowly and gives the lens capsule time to become adjusted. Because the iris prolapses spontaneously it is unnecessary to introduce a forceps into the anterior chamber. The iris is grasped peripherally and the coloboma becomes broad. *F. H. Haessler.*

Samoilov, A. I. **The principles of specific therapy in the management of tuberculous diseases of the eye.** Russkii Opht. Jour., 1930, Aug.-Sept., pp. 145-159.

Samoilov applies Ranke's classification of tuberculous lesions to the study of ocular tuberculosis. Both the first period, of primary affection, and the third period of general immunity, are complicated by ocular involvement only in exceptional cases. Tuberculosis of the eye is mostly an affection of the second, allergic, period of systemic tuberculosis. From the ophthalmologic standpoint it seems advisable to introduce a further subdivision of this second period into: (2a) a slightly increased sensitiveness; (2b) marked allergic properties; and (2c) an incipient general immunity. A thorough clinical, roentgenologic and immunobiologic study is necessary in every case in order to establish the tuberculous status of the patient.

The use of tuberculin is of distinct value in groups 2a and 2c, its therapeutic effect being most spectacular in cases of group 2a. In tuberculous lesions of the eye classified under group 2b, tuberculin is contraindicated because of the danger of severe general and focal reactions. The author favors the cautious use of old tuberculin rather than of less investigated newer preparations. In his opinion tuberculin therapy of eye patients should be placed in the hands of ophthalmologists well acquainted with the problems of general immunity in tuberculosis. This will facilitate a constant ophthalmoscopic and slit-lamp study of the important focal reactions in tuberculin therapy of the eye. *M. Beigelman.*

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Bordier, H. **Concerning the effect of moire, that is, waves by transparence and waves by reflection.** Arch. d'Opht., 1930, v. 47, August, p. 560.

In a previous article the writer showed an illustration in which the black bands corresponded to the widest separation of the filaments of two superimposed grills. In reply to a criticism of this photograph he shows another taken against a black background where the black bands correspond to the crossing of the lines. In both cases the moire phenomenon is due to circles of diffusion and the color of the bands merely depends upon whether there is reflection from the background or not. *M. F. Weymann.*

Derby, G. S. **Ocular neuroses: an important cause of so-called eyestrain.** Jour. Amer. Med. Assoc., 1930, v. 95, Sept. 27, p. 913.

Ocular neuroses are common. They are frequently not recognized and are probably less well handled than any other class of ophthalmologic cases. Frequently a neurosis is started or confirmed in a susceptible case by failure of the ophthalmologist to make the diagnosis and give suitable treatment. In making the diagnosis an adequate history is most important. Time must be spent on the patient if the result is to be a success; in most instances the prognosis is favorable. In nearly all cases they may be treated successfully by the ophthalmologist. In but a few cases is a psychiatrist necessary. The word eyestrain is an unfortunate term. Eyes are seldom strained; the eye is provided with a large factor of safety, and the healthy eye does not become diseased even by excessive use.

George H. Stine.

Marquez, M. **The great practical importance of the bicylindrical combination in the determination of refraction.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, April, p. 169.

Biastigmatism, the resultant of the corneal and the residual astigmatisms, is of practical importance. The residual astigmatism, called by Tscherning supplementary, is mainly lenticular, but it may be due to the other refracting surfaces, such as the posterior surface of the cornea and the surface of the retina. Residual lenticular astigmatism, due to a partial contraction of the ciliary muscle in overcoming the corneal astigmatism, often persists in spite of correction of the latter, and its axis is sometimes oblique in relation to it. Its recognition and correction not only secure much better vision but relieve many intractable cases of asthenopia. The principles of biastigmatism were formulated by the author as early as 1909. Jackson and Duane, and lately Lindner and Krämer, have extended their application in the form of cylinder retinoscopy. The author's procedure is as follows: The patient is made weakly myopic with a +0.75 lens or a corresponding undercorrection of his myopia. The ophthalmometrically determined corneal astigmatism is corrected and the residual astigmatism found by the astigmatic chart and corrected with a second cylinder. Conversion of the two cylinders of oblique axes into a spherocylindrical combination may be done by means of the tables of the author, those of Krämer, or those of the firm of Nitsche and Guenther. The general rules are: Two cylinders of equal sign and strength result in a cylinder with axis bisecting the acute angle formed by their axes. If of unequal strength, the new axis lies nearer the stronger one. Two cylinders of opposite sign and equal strength form a cylinder with axis bisecting the obtuse angle formed by their axes. If of opposite sign and unequal strength, the new axis lies nearer the stronger original one. In general an approximate spherocylinder can be substituted. Occasionally the actual bicylindrical correction is alone found optically practicable, as for example when a cylinder of 0.17 is the resultant. In amblyopia the first cylinder is determined by the ophthalmometer and the second one by retinoscopy. In some cases the author

employs what he calls the "random" procedure, that is, the first cylinder is a cylinder chosen at random to locate the blackest meridian on the astigmatic chart, and a second cylinder is used to neutralize its effect as needed to secure equal blackness. *M. Davidson.*

Noiszewski, Kasimierz. **Accommodation in looking at distant objects.** Arch. d'Opht., 1930, v. 47, Sept., p. 601.

Struck by the fact that many myopic individuals have a marked improvement in distant vision when narrowing their palpebral fissure to a slit, the writer has made measurements to determine the exact amount of this improvement. These measurements are given in tabular form. The improvement in distant vision is explained on the basis that the meridional fibers of the ciliary muscle in myopic individuals draw the retina and choroid forward when the palpebral fissure is narrowed. The pull of this muscle in trying to improve distant vision also explains the increased incidence of detachment of the retina in myopic individuals. There is no mention made in the article that the improvement in vision might be due to the stenopaic affect of the semi-closed lids. *M. F. Weymann.*

Ovio, G. and Hertel, E. **The light sense.** Ann. di Ottal., 1930, v. 58, Aug.-Sept., p. 643.

This is the second part of a joint study and is from the pen of Professor Hertel. It is an endeavor to unify methods by means of the spherical adaptometer. Difficulties are encountered in that subjective sensations cannot be recorded with exactitude and only in terms of the intensity and length of light waves. After describing the appliances heretofore employed for this purpose the author gives the construction of his own.

The deductions reached are that the spherical adaptometer is an appliance which permits variations, in a simple way, of the intensity of the objective light stimulus and expresses the values obtained in terms of light units. In pathological conditions its use would be still greater, but it would require the collaboration of many observers before final results could be evaluated.

Park Lewis.

Santanastaso, A. **Ocular refraction in the first years of life.** Ann. di Ottal., 1930, v. 58, Oct., p. 852.

It is generally taught in the text-books that the eyes of infants are hyperopic. There have been few recent researches on this subject. The author examined the eyes of eighty-four infants by skiascopy and later after the instillation of atropine. Those examined varied from one hour after birth to twenty-two months. He arrived at the conclusion that the human eye at birth has a higher refractive value than at a later period. Of the infants examined seventy percent were hyperopic; twenty-five percent myopic; and the remainder emmetropic. In later months hyperopia was in excess. There is a wide range in the recorded length of the optic axis at different periods of life and according to various authorities the cornea has become more stabilized in the adult. The crystalline in the infant is more elastic and more strongly curved, approaching a globular form. The later formation of the anterior chamber causes a nearer approach of the crystalline to the cornea. These differences together with varying intensities of light cause wide ranges in refractive values. Also in the atropinized eyes the refraction is lowered by seven or eight diopters and with reduced light from 40 watts down there is a constant lessening of the refraction. The author's optical studies very largely confirm these findings.

Park Lewis.

Sgrosso, Salvatore. **Comparative researches on the refractometer and clinical examinations of refraction.** Arch. di Ott., 1930, v. 37, p. 241.

The article contains no new matter and otherwise does not lend itself to abstraction. *David Alperin.*

Weekers, L. and Hubin, R. **The clinical importance of stereoscopic acuity.** Bull. Société Belge d'Opht., 1930, no. 60, p. 34.

Stereoscopic acuity is not the affair of the physiologist alone. Its practical importance has increased lately, and the clinician should be prepared to measure this visual function, so indispensable to aviators and so important in the case of public chauffeurs. In work in radiology, in the army, in industry, and in various sciences, such as astronomy and physics, one uses instruments which require good stereoscopic vision. Accidents among workers may cause diminution of stereoscopic acuity.

The writers describe two practical methods of measurement for clinical use. They note Javal's demonstration that one may have good binocular vision but a poor sense of relief. In measuring the latter a person requires a more delicate mechanism, which will bring into play the appreciation of distances. The methods follow:

(1) One mechanism, based on that of Brooksbank, consists essentially of three black threads stretched in a vertical position. This method was found to be especially useful in examining aviators and chauffeurs.

(2) The stereoscopic tests preferred by the authors are those in use in the French army, they are especially indicated for examining persons such as sailors, artillery observers, and others whose profession requires the use of stereoscopic instruments.

As a result of their tests the authors conclude that one-eyed persons (both recent and old) are manifestly inferior in stereoscopic acuity to persons having binocular vision. The tests were tried on emmetropes, hyperopes, myopes, amblyopes (ex anopsia), and persons who were one-eyed for less than a year or more than a year. (Six tables of data; thirteen references.)

J. B. Thomas.

4. OCULAR MOVEMENTS

Di Marzio and Fumarola. **Disorders of the binocular associated movements.** Riv. Oto-Neuro-Oft., 1930, v. 7, July-Aug., pp. 289-333.

Di Marzio mentions the different binocular associated movements, names the groups of muscles effecting each of them and expounds the physiologic reasons connected with these coordinated, synergetic and concomitant muscular actions.

He divides the movements into associated extrinsic movements or movements of direction and movements of convergence, and associated intrinsic movements or pupillary and accommodative movements. He divides the disorders of all these movements into two classes: tonic disorders, which are due to lesions of the centers and pathways of the nervous apparatus which normally regulate the muscular tonus, and paralytic disorders, which are due to lesions of the corticonuclear centers and the pathways which normally regulate voluntary muscular contraction.

The disorders of the muscular tonus are divided as follows: disturbances of the static equilibrium, nystagmus and its different forms; disturbances of the kinetic movements, spasm and the different forms of muscular contractures; and ataxic disturbances, dissociation of the binocular coordinated movements.

The paralytic disorders are divided into disturbances of vertical movements, of horizontal parallel movements, of convergence and of divergence. Di Marzio summarizes all cases reported in the literature and cites their local and general symptoms and autopsy findings.

Fumarola, in the second part of the article, explains the anatomy and physiology of the nuclear chains of the sensory and motor nerves of the medulla, the pons and the mesencephalon which regulate the ocular movements. He gives special attention to the nuclei of the abducens and facial nerves, which although parts of different reflex systems are indirectly connected with the nuclei of the oculomotor nerve.

He states, on the basis of anatomic knowledge and experimental and clinical evidence, that the nucleus of the sixth nerve is the coordinating center

and controls conjugate lateral movements, the fan nucleus controls associated movements downward, the Westphal-Edinger and Perlia's nuclei control the movements of convergence, pupillary contraction and accommodation, and Darkchewitsch's nucleus controls the closure of the eyelids and the associated movements of the eyeballs upward.

The authors conclude that disorders of associated binocular movements are the results of lesions located as follows: in the cortex and subcortex of the frontal lobe and the inferior parietal lobe; along the corticofugal pathways, which from the pes pedunculi go to the lemniscus; in the nuclei of the oculomotor nerves, and in the pathways of association between the nuclei of the motor nerves of the eyes and the nuclear chains of the medulla, the pons and the mesencephalon. (Bibliography.) *Melchiore Lombardo.*

Haycraft, G. F. **The fields of vision in miners' nystagmus.** Brit. Jour. Opht., 1930, v. 14, Oct., p. 523.

Fields from a series of forty-three cases, eight recent and thirty-five old, were used in this investigation. In a large percentage of the cases definite field alteration was observed. The commonest change is a concentric contraction for white. A large number show contraction for red and blue with interlacing. The amount of contraction is usually, but not invariably, a measure of the severity of the disease.

In the absence of physical signs, the change in the fields as described, combined with typical subjective symptoms, can be relied upon in diagnosing miners' nystagmus or in determining that recovery is still insufficient to permit work underground.

D. F. Harbridge.

Lebensohn, J. E. **Car-sickness.** Arch. of Ophth., 1930, v. 4, Sept., pp. 342-47.

It is now generally admitted that labyrinthine stimulation is an important factor in car-sickness, sea-sickness, and the like. A nystagmus is set up by the eye following the panorama passing before it, with its faster component in the direction in which the vehicle is moving.

A number of observers have found that correction of the refractive error is of considerable benefit. The phenomena are those of disturbances in the sympathetic nervous system. Gastric inhibition is preceded by duodenal antiperistalsis; the pylorus stays in constant occlusion and the fundus in long continued atony with the cardia relaxed. Gastric retroperistalsis and vomiting follow.

From a series of experiments in which nystagmus is induced by observation of a revolving kymograph, while a deflated balloon is introduced into the stomach and there inflated to a pressure of about 5 cm. of water for recording the movements of the stomach, the author concludes that car-sickness is due to labyrinthine stimulation, rather than to optic nystagmus. Labyrinthine disturbances are depressive in character; optic nystagmus is not. It appears, however, that errors of refraction and of muscle balance do play some part, probably lowering the threshold for nausea. The author believes that to go hungry when traveling is further conducive to these phenomena.

M. H. Post.

Levine, Joseph. **Paralysis of an extraocular muscle after spinal anesthesia.** Arch. of Ophth., 1930, v. 4, Oct., pp. 516-520.

Complications following spinal anesthesia are rare. Syncope and vascular hypotension are the earliest and most common. Later, and with less frequency, the nervous system is involved, often resulting in paralysis of the extraocular muscles. Abducens involvement is far the most common of these. Various theories are propounded for this fact. The sixth nerve is especially susceptible because of its position in the fourth ventricle. It is possible that in some cases an old luetic infection is stirred up by the injection. Stovain is the drug most frequently responsible.

It affects not only the sensory nerve-endings, but also motor nerves, and is fairly toxic. One case is reported.

M. H. Post.

Michaïl, G. **Serous bacillary meningitis.** Ann. d'Ocul., 1930, v. 167, Aug., pp. 642-652.

There was a marked weakness of the external recti. The malady ran a benign course and recovery followed lumbar punctures. The cause was thought to have been a mild nasopharyngitis.

Lawrence T. Post.

Niyazi, Ismet. **Two cases of ophthalmopleglia due to syphilis treated with lipiodol.** Türk Oftal. Gaz., 1930, v. 1, Jan., p. 333.

In the first case reported, one of unilateral paralysis of the third nerve, intravenous injections of cyanide of mercury and one intraspinal injection of lipiodol (5 c.c.) were followed by complete recovery in two months. The blood Wassermann was negative, but the history given by the family physician favored the diagnosis of syphilis. In the second case there was complete unilateral ophthalmoplegia due to syphilitic osteoperiostitis of the apex of the orbit. Lipiodol was used intraspinally in conjunction with cyanide of mercury intravenously. No effect was noted until 1 c.c. of lipiodol was injected intraorbitally; marked improvement followed within seven weeks.

George H. Stine.

Ribas Valero. **Symptomatology of paralytic strabismus.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, Feb. and March, pp. 57 and 115.

In an excellent review of the whole subject of paralytic strabismus the author follows very closely the teachings of Bielschowsky. Adrian's views, published in the Archivos for April, 1929, to the effect that, while the vertical recti are adductors and the obliques abductors in the primary position, their action in the oblique lateral positions is reversed, are criticized. The author points out that Adrian's views are based on purely theoretical considerations, but are disproved by clinical observation. An elaborate chart to aid in the analysis of the muscles involved in paralytic and spastic strabismus is included.

M. Davidson.

Rugg-Gunn, A. **An occluder for squint.** Brit. Jour. Ophth., 1930, v. 14. Oct., p. 520.

This apparatus consists of two parts: a half lens of chavasse glass which covers rather more than the nasal half of the spectacle lens, behind which it is worn, and a rubber projection which can be trimmed when necessary to fit into the inner aspect of the orbit. Chavasse glass has one surface plain and the other mottled; the effect is to permit a perfectly clear view of the eye, while at the same time vision is reduced to 6/60.

The straight edge of the occluder occupies a position opposite the temporal margin of the pupil of the better eye, thus preserving macular vision in the temporal field. This encourages convergence relaxation and stimulates macular vision in the squinting eye. It may secondarily relieve accommodative spasm. (Two illustrations.)

D. F. Harbridge.

Smith, H. C. **Imbalance of the vertically acting extraocular muscles.** Arch. of Ophth., 1930, v. 4, Oct., pp. 533-544.

Twenty patients are reported on. Of these, thirteen were especially important. Nine had congenital paralysis of the superior rectus, with inferior oblique spasm. Four were attributed to trauma. In six cases esotropia was present. In five of them, operations for this condition had been performed. Ten patients had been operated on by tenotomy of the inferior oblique. In one case in which there was paresis of the superior oblique, tenotomy of the conjugate inferior rectus had been performed. Of the ten patients with tenotomy of the inferior oblique, three showed total correction and seven residual vertical imbalance. In the case

operated on by tenotomy of the inferior rectus, there was no improvement two days after the operation. Head tilting was present in six cases. In four, it took the direction of the primary action of the muscle involved, in two, the opposite direction. Five years after an otherwise satisfactory operation, one patient still showed head tilting, in three it was abolished, in two it was constantly present, and in one occasionally. Three cases are reported in detail. There is still question whether the operation for vertical imbalance should precede the operation for lateral disturbance or not.

Constantly changing muscle balance suggests a nerve disorder, such as multiple sclerosis. It is well to be sure by observation over a considerable period of time that the condition is stationary.

M. H. Post.

5. CONJUNCTIVA

Coppez, L. **Trachoma and surgical diathermy.** Bull. Société Belge d'Opht., 1930, no. 60, p. 56.

The writer reports briefly the treatment of three severe cases of trachoma by surgical diathermy following the technique of Monbrun of France. All were complicated by pannus and corneal ulcers. The results were prompt. In one case illustrated by photographs the conjunctiva appeared to be remarkably smooth three weeks after the first treatment. *J. B. Thomas.*

Cuénod and Nataf, R. **Tarsal biomicroscopy in certain types of conjunctivitis.** Arch. d'Opht., 1930, v. 47, Aug., p. 543.

A detailed description of pictures of the tarsus, made with the slit-lamp and corneal microscope, in its normal condition, in irritation from foreign bodies, in conjunctivitis due to the Koch-Weeks bacillus, in follicular conjunctivitis, and in vernal catarrh is offered. Although the appearances are not pathognomonic, much assistance in making a diagnosis may be obtained by biomicroscopy of the tarsus.

M. F. Weymann.

Gardilcic, Ante. **A new method of trachoma treatment.** Zeit. f. Augenh., 1930, Sept., v. 72, p. 187.

The author reports with great brevity his success in treating corneal lesions by the use of massage combined with instillation and subconjunctival injection of oxidizing (chlorine) and proteid solvent (alkali) compounds.

F. H. Haessler.

Gifford, S. R., and Lazar, N. K. **Inclusion bodies in artificially induced conjunctivitis.** Arch. of Ophth., 1930, v. 4, Oct., pp. 468-475.

Halberstädter and Prowazek first described peculiar bodies in the epithelial cells found in cases of trachoma. Halberstädter believed them to be living parasites and called them chlamydozoa. They were soon found in this disease by numerous other observers. Presently, however, they were found in other diseases. They were found associated with gonococci and were taken to be a strain of gonococcus. Lindner believed they represented a mixed infection. They were found even in scrapings from normal conjunctivæ. The identity of these organisms, however, was questioned. Von Szily thought they might be broken down nuclear products, but Axenfeld disagreed with this conclusion. The latter, reviewing the evidence, felt that they probably represented a living parasite, but did not believe that they solved the problem of the etiology of trachoma. Since that time, their importance in the etiology and diagnosis of trachoma has been considered of less and less moment.

Ida Bengtson found them in forty-five percent of 230 cases of trachoma. She felt that they represented stages of digestion and clumping together of rod-shaped bacteria within the epithelial cells.

The authors of this paper produced conjunctivitis in rabbits and guinea-pigs by the introduction of bacillus pseudotuberculosis rodentium. The resulting inflammation lasted for about thirty days. Nicotine and croton oil were also used to produce inflammation of the conjunctiva. Giemsa and Lind-

ner's contrast stain was used in studying the scrapings made from these cases. Typical inclusion bodies were produced. Those produced by all three agents were identical in morphology and staining reactions. They felt that the fact that chemical irritants produced a conjunctivitis in which they were found disproved the theory that they could be degenerated bacteria. They were identical in morphology and staining reactions with those found in trachoma. These inclusions, therefore, appear to be produced by inflammation of the conjunctiva, with swelling and lymphoid hyperplasia, and would appear to be of no importance in the etiology and diagnosis of trachoma.

M. H. Post.

Gomez Marquez, J. **A new operative procedure for the treatment of pterygium.** Ann. d'Ocul., 1930, v. 167, Sept., pp. 762-768.

A pterygium is like a tumor. Recurrence depends on growth from unexcised cells, more frequently at the base than at the head. Failure to excise completely these episcleral cells near the limbus is responsible for the trouble. The author suggests complete excision, and then replacement of the conjunctival tissue excised by a graft from the conjunctiva of the other eye. He suggests the procedure for recurrences only. *Lawrence T. Post.*

Kendall, A. I., and Gifford, S. R. **Trachoma and avitaminosis.** Arch. of Ophth., 1930, v. 4, Sept., pp. 322-325.

In an effort to determine whether a relationship exists between deficiency of vitamin A and trachoma, a series of white rats deprived of vitamin A were inoculated with bacterium granulosis procured from Finnoff, of Denver, a Noguchi culture from Olitsky, of the Rockefeller Institute, and one freshly isolated by the authors from a case of trachoma.

Three series were experimented on. The first consisted of animals deprived of vitamin A for thirty days and showing keratomalacia; the second, animals deprived for ten days before inoculation and for eighteen days following it, and the third series deprived of vitamin A for ten days before inoculation with bacterium granulosis, previously grown on rat blood agar, and then with cultures grown on Noguchi leptospira medium. All inoculations failed.

A single inoculation was made with B. pseudotuberculosis rodentium, and afterwards a reinoculation with bacterium granulosis. This also failed. In a similar manner, animals were first inoculated with streptococci obtained from trachoma material and sarcina-like organisms from a similar source. But in these experiments, also, reinoculation with bacterium granulosis failed. The authors feel that these negative results are suggestive, though not at all conclusive, that deprivation of vitamin A plays an important part in infection from trachoma.

M. H. Post.

Loddoni, G. **An anomalous case of ocular pemphigus.** Ann. di Ottal., 1930, v. 58, July, p. 605.

The author describes the course of an anomalous case of ocular pemphigus in a woman forty-five years old. She had previously suffered from a bilateral episcleritis with wrinkling of the conjunctiva. The conjunctival lesion was initiated in the form of an ulceration of the left eye. This developed into a deep malignant spot in the sclera, which in a short time completely destroyed a limited zone. In the right eye it began in the bulbar conjunctiva as a profound and extensive ulceration with scleral necrosis. The diagnosis was verified later by the development of a blister in the buccal mucosa. The disease ceased to progress after penetrating to the choroid. The conjunctivo-scleral ulceration persisted for four months, from January to April. (Bibliography.)

Park Lewis.

Marinocci, A. **Study of conjunctival xerosis.** Ann. di Ottal., 1930, v. 58, July, p. 593.

Xerosis of the conjunctiva is characterized clinically by excessive dryness of the tissue with structural changes

from different causes or conditions. It may be epithelial or parenchymatous. It may be benign or malignant. In the former, white frothy spots (Bitot plaques) are seen, commonly on the external triangle of the bulbar conjunctiva. The malignant form invades the whole conjunctiva, causing ulceration and opacity of the cornea. It occurs in the poorly nourished, in the alcoholic, in those suffering from chronic gastritis, in those with affections of the liver, and in cachectic individuals. It is sometimes endemic under bad sanitary conditions. The author made histological examinations in two cases of epithelial xerosis and in three of the parenchymatous forms. In the epithelial type the cuticularization of the epithelium of the conjunctival mucosa was partial; in the parenchymatous type it was complete. By bacteriological and serological research the authors were able to produce every pathological evidence of the xerosis bacillus. (Bibliography.)

Park Lewis.

Moretti, E. **On epithelial xerosis with small spots on the palpebral conjunctiva.** Ann. di Ottal., 1930, v. 58, Aug.-Sept., p. 778.

Xerophthalmia is a condition which is characterized by dryness of the conjunctiva and cornea. Clinically it appears in two forms; when it involves the cornea it is known as keratomalacia and when it affects the conjunctiva as conjunctival xerosis. Keratomalacia occurs for the most part in premature or undernourished children or in the congenitally luetic; it is rapid in development and in a few hours it may destroy the cornea and result in panophthalmitis.

When it invades the conjunctiva it may be epithelial or parenchymatous. In the latter form it begins on the bulbar conjuntiva in little spots and soon involves the entire conjunctiva. Cicatrices are formed and these take on a whitish powdery aspect which spreads and gives an appearance as though the tissues had been smeared with a fatty material. Parenchymatous xerosis, frequently the final phase of a chronic trachoma, a pemphigus, a diphtheric infection or a burn, is sometimes considered as atrophy of the conjunctiva.

The associated symptoms such as hemeralopia, partial or complete insensibility of the cornea, of the conjunctiva and more or less extensively of the face and dilatation and contraction of the pupil would indicate an involvement of the nervous system. The disease as described was found in an old case of trachoma in which a small, perfectly isolated spot of xerosis was present in the lower palpebral conjunctiva.

Park Lewis.

Oreste, A. **Etiology of spring catarrh.** Ann. d'Ocul., 1930, v. 167, Oct., pp. 833-840.

Three points are especially worthy of consideration: (1) Seasonal recurrence. Atmospheric conditions, perhaps, as well as some infection (measles) play a reciprocal rôle in certain subjects. (2) Contagiousness. From the fact that syphilis is not seen in those afflicted, Gabriéidès argues that vernal catarrh may be from some syphilitic toxin. (3) The fact of the resistance of the disease to specific therapy is not surprising, for parasyphilitic lesions require special and prolonged treatment.

Lawrence T. Post.

Pacalin, F. **Does acute trachoma exist?** Arch. d'Opht., 1930, v. 47, Oct., p. 690.

Three cases of acute conjunctival inflammation with trachoma are reported in which no organisms could be found in smears, but in all of which immediate improvement was noticed after copper therapy. The writer believes that true acute trachoma may exist and that such inflammations are not due to secondary infection by other organisms.

M. F. Weymann.

Roche, Charles. **The contagion of trachoma.** Arch. d'Opht., 1930, v. 47, Oct., p. 680.

Observation of isolated cases of trachoma in localities where the disease is unknown, instances of only one member of a family being affected where

many members live in close quarters, instances of unilateral trachoma, and the fact that persons such as physicians may come in contact with trachomatous individuals over a period of years without contracting the disease make it appear dubious at times that trachoma is infectious. However, epidemics occurring in schools and localities tend to demonstrate conclusively that it is infectious. To correlate and explain these seeming incongruous observations the writer assumes that trachoma is infectious for only a short period of time before the granulations appear in the lids. If this fact is found to be true it will explain why epidemics occur and why old cases of trachoma appear to be so slightly dangerous.

M. F. Weymann.

Stastnik, E. **A new method for the treatment of trachoma.** Klin. M. f. Augenh., 1930, v. 85, Sept., pp. 396-400.

Stastnik reports good results from intravenous injections of 2.00 gm. of thiosulphate and 0.02 gm. of sulphate of copper in 9 c.c. of distilled water every fourth day, up to a total of ten injections. Fifteen out of twenty-three cases of chronic cicatricial trachoma were also treated locally. Aside from slightly increased temperature no ill effects were observed except in one patient, who suffered from chills and arhythmic pulse, but recovered after three days..

C. Zimmermann.

Suchting, Otto. **On a case of intrauterine acquisition of ophthalmogonorrhea with bilateral corneal involvement.** Zeit. f. Augenh., 1930, v. 72, Aug., p. 32.

A case of typical gonorrheal conjunctivitis and purulent keratitis is described. It is most probable that the eyes were infected in utero.

F. H. Haessler.

Toulant, P. **An Algerian epidemic of acute follicular conjunctivitis.** Arch. d'Opht., 1930, v. 47, Nov., p. 793.

This affection begins suddenly with the sensation of a foreign body. After two days the conjunctiva is red, with abundant mucopurulent secretion. Follicles appear within four to eight days. They are small and located mostly upon the superior palpebral conjunctiva. Swelling of the preauricular gland always occurs, at times accompanied by tenderness. The bulbar conjunctiva is edematous, with no lesions at the superior limbus. In the late stages the corneal epithelium is roughened but no ulcers appear. Cultures and smears revealed no organisms, and an attempt to inoculate a second individual with the secretion was unsuccessful. The duration is two to three months. It is possible that this may be a type of "acute trachoma". In the early stages one percent chloramine of toluene gives the most relief, while after the cornea is involved painting the lids with two percent silver nitrate is most efficacious.

M. F. Weymann.

Van der Straeten. **Prophylaxis of ophthalmia neonatorum.** Arch. d'Opht., 1930, v. 47, Sept., p. 587.

This article is a historical and practical discussion of the prophylaxis of ophthalmia neonatorum. It is recommended that more care be given to the disinfection of the genital tract of the mother instead of relying entirely upon the instillation of silver nitrate into the infant's eyes. *M. F. Weymann.*

Velter, T. L. **Acne rosacea of the cornea and conjunctiva.** Russkii Opht. Jour., 1930, Oct., pp. 315-320. (See Section 6, Cornea and Sclera.)

6. CORNEA AND SCLERA

Chefik, Ibrahim. **Coccidioidal infection of the frontal sinus and the cornea.** Türk Oftal. Gaz., 1929, v. 1, Oct., p. 259.

The author reports a case of cystic swelling of the right frontal sinus with compression of the eye causing both exophthalmos and lagopthalmos. Pressure over the frontal region caused increased exophthalmos. The lower half of the cornea showed parenchymatous infiltration with superficial ulceration.

An oily puslike secretion covered the globe. The nose was normal. A hard mass was palpated in the right abdomen; the spleen was enlarged and ptosed. Microscopic examination of the secretion from the frontal sinus and of curettings of the corneal lesion showed the microgametocytes of coccidia. The sinus infection was no doubt produced by aspiration of infected water into the nose according to the custom of the Moslems. The eye was infected probably by direct contact. The usual therapeutic measures healed the cornea within fifteen days.

George H. Stine.

Churgina, E. A. **Reciprocal action of the primary and reinfection foci in experimental tuberculosis of the cornea of the rabbit.** Klin. M. f. Augenh. 1930, v. 85, Sept., pp. 375-384. (4 ill.)

After splitting the corneal lamellæ of rabbits, Churgina injected a tubercle culture (emulsion) into the pocket. Upon formation of granulomas and nodules, the cornea of the second eye was inoculated in the same fashion in one series of rabbits, and in another series on another place of the first cornea. The result was that the keratitis disappeared after from two to two and a half months, showing that the inoculation of the cornea of the rabbit with tubercle virus may defend the corneal tissue, as well as that of the other eye, against new infection even if a generalization of the tuberculous process has not taken place. Thus this method of localization of the primary and also the secondary tuberculous foci in the transparent, easily observable tissue of the cornea clearly demonstrated an interchangeable action of both foci, evidenced by a lighter course of both processes. It showed that the corneal tissue is able not only to participate in the general immunity of the organism, but also to probably produce immunizing bodies. *C. Zimmermann.*

Derkac, V. **Skin transplantation according to Denig in trachomatous pannus.** Klin. M. f. Augenh. 1930, v. 85, Sept., pp. 409-411.

Light cases of pannus do not require a special antipannous therapy. In all severe cases Derkac had very good results with Denig's transplantation, provided that skin was used instead of mucous membrane of the lip which within two or three weeks is invaded by the trachomatous process and disappears. This was as also histologically proved by Seefelder (Klinische Monatsblätter für Augenheilkunde 1928, v. 81, p. 68; abstract American Journal of Ophthalmology, 1929, Feb., p. 160).

Above the limbus along half its circumference the conjunctiva is excised and the sclera very carefully freed with a lance-shaped knife or Graefe's knife from all adherent tissues, the pannus is scraped, and the cornea is touched with tincture of iodine. A rectangular piece of skin from 4 to 5 mm. wide is cut from the anterior surface of the upper arm of the patient, liberated from subcutaneous tissue, and sewed to the upper wound lip of the conjunctiva. Twenty-five percent argyrol salve is applied and the eyes bandaged for five days, the operated one for from three to five days longer. The only disagreeable feature is the exfoliation of epithelium of the transplanted piece; this, however, may be remedied by cauterization of the epithelium or occasional scraping.

In some cases the transplanted piece was completely absorbed after one or two years, but the good result of the operation was permanent, probably due to the peridectomy with subsequent cauterization. *C. Zimmermann.*

Doggart, J. H. **Marginal degeneration of the cornea.** Brit. Jour. Ophth., 1930, v. 14, Oct., p. 510.

This is a rare, bilateral condition, twice as common in men as in women, with opacity and vascularization of the peripheral zone of the cornea as its earliest signs. The epithelium remains intact, but there follows a progressive thinning of the cornea at the expense of Bowman's membrane and the anterior layers of the substantia propria, so that a gutter is formed. As the process continues, the gutter deepens and the cornea begins to bulge. Vision is

greatly impaired by the development of a high astigmatism against the rule.

The condition may be present for from ten to twenty-five years before rupture. It begins in one eye and persists frequently for a considerable time before being discovered; it eventually affects the fellow eye, but this may be delayed twenty-five years. Its occurrence is more frequent between the ages of twenty and forty years.

The cardinal symptom is a slow failure of vision in one eye and years later in its fellow. Cauterization in one case gave satisfactory results, while in another only fair. (Two illustrations, bibliography.) *D. F. Harbridge.*

Filatow, W. P., and Kalfa, S. **Pathological anatomy and treatment of epithelial dystrophy of the cornea. (Fuchs.)** Klin. M. f. Augenh. 1930, v. 85, Sept., pp. 401-404.

A case of epithelial dystrophy of the cornea in a man, aged sixty years, is reported in detail. A strip of conjunctiva from 0.3 to 0.5 cm. wide around the cornea was excised and replaced by mucous membrane of the lip. This relieved the condition after a month. The cornea became more transparent; the vision, which had been lost, recovered to counting fingers at one meter.

In accordance with the slit-lamp findings, the excised conjunctiva and a small piece of the cornea showed anatomical degeneration of the epithelium, proliferation of connective tissue under it, and edema of the corneal and also the conjunctival tissues caused by changes of the bloodvessels, with consequent unfavorable conditions of nutrition. The periodicity of the amount of the corneal opacity and impairment of vision in the course of the day between eleven and four o'clock in this case may be brought in connection with temporary increase of disturbances of circulation, and this speaks for the probability that dystrophy owes its origin to the bloodvessels. Perhaps the frequent combination of dystrophy with glaucoma is caused by alterations of the walls of deep-seated vessels.

C. Zimmermann.

Karbowski, M. **Criticism of Denig's operation.** Klin. M. f. Augenh., 1930, v. 85, Sept., pp. 411-414.

Karbowski had excellent results from peritomy in 250 cases of trachomatous pannus. In ten out of twenty unsuccessful cases the peritomy was repeated with improvement. The other ten remained the same; Denig's operation was performed on these, but also without improvement. It is not superior to peritomy in the author's opinion.

He emphasizes that the conjunctiva must be incised close to the limbus in an extent of an arc of 180 degrees, the excised piece must be not less than from 3 to 4 mm. wide, and the subconjunctival tissue must be carefully removed. Peritomy has a better cosmetic effect than Denig's operation, which is technically more difficult and causes distress by the wound in the mouth. In peritomy only the bloodvessels of the conjunctiva and subconjunctival tissue, which can easily expand and carry much blood to the pannus, are severed. The small scleral vessels remain, which running in the stiff channels of the sclera do not increase in volume and cannot furnish a superabundance of blood. Since the limbus net has many anastomoses, the cut must be at least 180 degrees. *C. Zimmermann.*

Lemoine and Valois. **A form of keratitis with ephemeral manifestations.** Arch. d'Opht., 1930, v. 47, Nov., p. 788.

Five cases are reported, in four of which there was sudden onset of photophobia with a sensation of a foreign body. The fifth is apparently a case of recurrent erosion following a finger nail scratch. Biomicroscopy of two cases revealed numerous small superficial staining points scattered on the cornea. These healed within two days, leaving no scar. Attention is called to the similarity between these cases and the superficial punctate keratitis of Fuchs, the difference being that the latter is accompanied by catarrh and is of longer duration. "Ephemeral keratitis" is suggested as a designation for these cases of sudden onset and short duration.

M. F. Weymann.

Pallares Lluesma, Juan. **Corneal affections in acquired lues.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, March, p. 137.

Parenchymatous keratitis is the most common one. It can not always be distinguished from that due to hereditary lues, although unilaterality, lack of vascularization, slight symptoms of irritation, and rapid evolution are said to characterize it. So far all cases reported occurred between twenty and forty years of age, were tertiary manifestations and were found in lues acquired in infancy, in reinfection or superinfection in manifest heredolues, in cases with the primary sore in the eye or its adnexa as well as elsewhere. Less frequent forms are the keratitis punctata syphilitica of Mauthner, with deeply situated round circumscribed yellow dots of the size of a pin head, the type described by Alexander in which there is in addition general cloudiness of the cornea and an accompanying iritis, the keratitis pustuliformis profunda of Fuchs, the keratitis gummatosa with hypopyon, and finally the primary chancre as described by Binet. A case of keratitis parenchymatosa due to acquired lues is reported.

M. Davidson.

Pines, B. **Some remarks on the treatment of serpiginous ulcers.** Klinika Oczna, 1930, Sept., pp. 63-65.

Since 1925 the author has been using Birch-Hirschfeld's lamp for ultraviolet radiation of serpiginous ulcers of the cornea. Even in mild cases of hypopyon keratitis radiation alone is insufficient. Cauterization and, if necessary, incisions still constitute the basic treatment of serpiginous ulcers. Ultraviolet radiation is a valuable adjunct in the management of these cases, as it shortens materially the duration of the keratitis. The only contraindication to the use of ultraviolet rays is intraocular hypertension. *M. Beigelman.*

Srinivasan, E. V. **Krukenberg's spindle.** Brit. Jour. Ophth., 1930, v. 14, Nov., p. 602.

A female, aged twenty-seven years, whose right eye with corrected mixed astigmatism gave vision of 6/9, and the left eye with a low hyperopic astigmatism vision of 6/6 partly, presented in each cornea in front of the center of the pupil a vertically placed chocolate-colored patch 3.5 mm. long and 1 mm. broad. The fine pigment seemed to be distributed on Descemet's membrane. The right fundus showed a bright white fibrous scar, one limb extending up and out and the other down and out from the disc. The whole condition suggested a congenital anomaly.

D. F. Harbridge.

Velter, T. L. **Acne rosacea of the cornea and conjunctiva.** Russkii Opht. Jour., 1930, Oct., pp. 315-320.

In a case of acne rosacea of the cornea the following changes were found on histopathologic examination: desquamation and in part vacuolization of corneal epithelium; complete destruction of Bowman's capsule; nodules of infiltration immediately under the epithelium. These nodules were of a strikingly polymorphous character, consisting of lymphocytes, plasma cells, epithelial cells, giant cells, fibroblasts, neutrophiles, and eosinophiles. They were richly vascularized, and had many connective tissue fibers irregularly distributed among the cellular elements. Similar formations are described in the affected conjunctiva. In the treatment of corneal acne rosacea, Denig's transplantation of mucosa was resorted to in two cases. In one of them a recurrence took place ten months after the transplantation. *M. Beigelman.*

Wright, R. E. **Superficial punctate keratitis.** Brit. Jour. Ophth., 1930, v. 14, Nov., p. 595.

This is a continuation of the contribution appearing in the June issue of the same journal. The epidemic described afforded, during the year, some 3,500 cases. The character of the disease changed as time went on, so that the symptoms became more severe. It was difficult to determine the period of incubation, but experimental work indicated that it was somewhere between three and nine days. It became ap-

parent that acquired immunity was not very marked, as many recurrences were noted. The frequency of attack was as great in one eye as the other. The chief mistake in diagnosis was with simple catarrhal conjunctivitis, nodular dystrophy, or conjunctivitis induced by irritants. Unusual types such as horse-shoe-shaped opacities were observed. Atropin, cold compresses, and dionin were the remedies used. No organism was either found or cultivated which might be regarded as of etiological importance. *D. F. Harbridge.*

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Argüello, M. **Vitiligo of the iris.** Arch. de Oft. de Buenos Aires, 1930, v. 5, July and Aug., p. 314.

A forty-six-year-old woman complained of gradually diminishing vision of the left eye, with the appearance of small dots on the iris. A few of the latter were also present in the right eye.

The left eye showed a slight corneal infiltration with a few precipitates on its posterior surface. The iris was sprinkled with colorless dots, which appeared to be areas of atrophy, and between these the iris substance was normal. This produced an appearance not unlike a rubber sponge, the interstices of which were filled with a white substance. There was also a small posterior cataract.

The condition was first supposed to be chronic iridocyclitis. No focal infection was found and all laboratory examinations were negative. The Mantoux skin tuberculin test being positive, graduated doses of tuberculin were given for a month, without any improvement. As Professor Fuchs happened to visit the city at that time, he was requested to pass upon the condition.

The patient had had small-pox at the age of eight years. Professor Fuchs then pronounced the condition "vitiligo of the iris," which always occurs subsequent to small-pox infection. There is a dot-like atrophy of the iris similar to that after inflammatory glaucoma. The iris becomes flattened and presents the appearance of grayish filter paper.

A. G. Wilde.

Scotti, P. **On the variations of the endocular tension in anterior uveitis. (Clinical and tonometric researches.)** Ann. di Ottal., 1930, v. 58, Aug.-Sept., p. 701.

The endocular tension, if taken regularly in anterior uveitis, may have an important clinical prognostic value. All inflammations of the external ocular tissues may be accompanied by a greater or lesser variation in intraocular tension.

In involvements of the iris or ciliary region these alterations are more pronounced and may be detected by digital examination. The smaller variations are frequently of clinical value and can be discovered only by tonometric tests. They are also of value in making prognostic or therapeutic deductions.

The author discusses the physiology of endocular tension and the variations found in anterior uveitis; he reports cases from which clinical deductions are drawn. Three conditions may be found, namely, a hypotension, an alteration of hypertension with hypotension and a continuous hypertension. A slight increase in tension, often observed in acute uveitis accompanied by scant serous exudates, is probably due to sympathetic irritation. It soon passes and it requires no special treatment. Much more grave are those cases with abundant fibrous exudate which may go on to true secondary glaucoma. (Bibliography.)

Park Lewis.

8. GLAUCOMA AND OCULAR TENSION.

Cavara, V. and Federici, E. **On the remote results of anterior sclerectomy (Lagrange and Elliot) in the most advanced stage of chronic simple glaucoma.** Arch. di Ottal., 1930, v. 37, p. 263.

The authors speak of the fistulization operation as the operation par excellence in chronic simple glaucoma. It favors a better prognosis, as it seems to

arrest the fatal tendency to blindness when other methods fail; the visual acuity and field remaining unaltered.

David Alperin.

Derby, G. S. **Late postoperative separation of the choroid.** Arch. of Ophth., 1930, v. 4, Oct., pp. 530-532.

On January 8, 1929, the left eye was trephined with a 2 mm. blade, since which time the tension has remained about 10 mm. Hg. On April 23rd, the right eye was trephined. In each eye the anterior chamber was restored shortly after operation. On January 3, 1930, the patient reported that he had been seeing poorly with the right eye for two or three weeks. Central vision was 6/9, the field was contracted, and the anterior chamber was flat. There was a large separation of the choroid on each side, which extended back to the equator, and a smaller one below. Tension was 6 mm. No fistula through the flap could be made out, yet some leakage must have taken place, though not demonstrable. It was decided to dissect up the conjunctival flap, putting fresh conjunctiva over the trephine opening, and closing it as tightly as possible. On the operating table, however, the eye was found to be firmer and the anterior chamber reformed. No operation was performed. One week later, the choroidal separation had disappeared and the anterior chamber had reformed. Tension was up to 27 mm. Hg. It is almost certain that the reduction in tension accompanied some leak in the wound, and that closure of this leak restored a normal condition.

In most instances, the detachment occurs within eight days of the operation and disappears within a month. If it persists, it is recommended that a conjunctival flap be pulled down over the wound. Four cases in all were found in the literature of the last twenty-five years.

M. H. Post.

Kapuscinski, W. **Contribution to the study of development of excavation and atrophy of the optic nerve in simple glaucoma.** Arch. d'Opht., 1930, v. 47, Nov., p. 779.

By the experiment of subjecting coagulated albumin to incubation with aqueous, it was demonstrated that proteolytic ferments were not present in normal aqueous as supposed by Elschnig. A careful study of sections of the optic nerve of an eye affected with a hypertension of 52 mm. of mercury was made. It was found that the nerve fibers had disappeared in the center of the papilla, and that the lamina cribrosa was not pushed backward, but was thickened by the compressed glial tissue of the nerve fibers. The nasal rim showed the least damage to the nerve fibers, and there was no stretching of the latter. In the nerve itself there was very little lacunar formation. The lacunæ were thought to be secondary formations. The cupping is first caused by pressure atrophy of the central nerve fibers, and becomes deeper as the pressure thins the lamina cribrosa and forces it backward. The nasal fibers are the last to be damaged, because they are protected by the vessels.

M. F. Weymann.

9. CRYSTALLINE LENS.

Walker, C. B. **Exactly appositional sutures in the cataract operation.** Arch. of Ophth., 1930, v. 4, Oct., pp. 521-529. (See Amer. Jour. Ophth., 1930, v. 13, March, p. 273.)

10. RETINA AND VITREOUS.

Bedell, A. J. **The significance of some changes in the fundus vessels.** Arch. of Ophth., 1930, v. 4, Nov., pp. 695-719.

This interesting paper does not lend itself to abstraction, as much of its value and information is dependent upon the photographs accompanying it. In summarizing, the author calls attention to the value of the appearance presented by the blood vessels of the fundus. He believes that in some cases embolism of the central retinal artery may be differentiated from thrombosis of the same vessel by extravasation of blood about the nerve head in the for-

mer condition. Arterial degeneration has been rather lost sight of in the tendency to assign all symptoms and complaints to high blood pressure, which may or may not be a separate entity. In diabetes, the retinal vessels are frequently outlined by a yellowish-white exudate. Retinitis pigmentosa is differentiated from syphilitic retinochoroiditis by the smaller size of the arteries at the same stage of pigmentation of the retina, but lines of migrated pigment lodging about the retinal vessels are the result of either retinitis pigmentosa or syphilis. *M. H. Post.*

Gonin, J. **The treatment of detached retina by searing of the retinal tears.** Arch. of Ophth., 1930, v. 4, Nov., pp. 621-625.

This article is written especially for English-speaking ophthalmologists, because the author feels that there is considerable misunderstanding of his method of operation and results in detachment of the retina.

Before the French Ophthalmological Society, in 1920, the following conclusions were arrived at by the author: (a) As a rule, cases of spontaneous or idiopathic detachment of the retina showed one or more tears in the retina. (b) These tears were due to the vitreous humor dragging on the retina at the site of previous adhesions. (c) The picture in this type appeared the result of a flow of vitreous behind the retina rather than a subretinal exudate from the choroid.

In May, 1930, the records of 250 patients, with 300 operations, were summed up as follows:

(1) In each of ninety-five percent of the cases one or more holes were found. (2) In about ten percent the hole consisted of a rupture or tearing away of the retina at the ora serrata. (3) In all recent cases where the tear was closed by cauterization, cure was immediate, complete, and permanent. In older cases, restoration of vision generally remained incomplete. (4) Relapses were found only in cases in which the tear had not been completely closed, or where a second tear had escaped observation. Recurrences in another portion of the eye indicated further tearing of the retina.

The author feels that definite cure may be obtained in about sixty percent of recent cases, this percentage diminishing with the age of the patient. It is necessary to keep the patient in bed only eight days after the operation.

M. H. Post.

Jeandelize, P. and Baudot, R. **Considerations concerning treatment of spontaneous detachment of the retina by the method of Gonin.** Arch. d'Opht., 1930, v. 47, Nov., p. 764.

Eight cases operated after the method of Gonin are reported in detail. Three were bilateral. In all cases one or more tears were found in the retina. In two cases total reattachment was secured and in five cases noteworthy improvement was obtained. Attention is called to the short period of bed rest demanded in the Gonin method. Certain retinas are found to be quite friable, in which cases the operative procedure is not successful. Any general disease should be treated before operation. *M. F. Weymann.*

Kleefeld, G. **Three cases of exudative retinitis in young subjects.** Bull. Société Belge d'Opht., 1930, no. 60, p. 23.

Cases of Coats's retinitis are very rare. The periods of observation in the three cases reported by the author were (1) several months, (2) one year, and (3) two and one-half years, respectively. The diagnosis was reached slowly. Cysticercus and malignant tumor were suspected. The very slow development of the disease in two cases, the absence of changes in adjoining tissues and the optic nerve, and the absence of change of ocular tension helped to confirm the diagnosis. In one case neither antisyphilitic or antituberculous treatment nor attempts to dissolve the new tissue had any effect on the evolution of the lesion. *J. B. Thomas.*

NEWS ITEMS

News Items in this issue were received from Drs. C. A Clapp, Baltimore; E. D. Le Compte, Salt Lake City; G. Oram Ring, Philadelphia; F. H. Roost, Sioux City, Iowa; George H. Shuman, Pittsburgh; and Charles P. Small, Chicago. News items should reach **Dr. Melville Black,** Metropolitan building, Denver, by the twelfth of the month.

Death

Dr. Samuel Theobald, Baltimore, aged eighty-four years, died December 20, 1930, of senility.

Miscellaneous

The Illinois Society for the Prevention of Blindness was left $10,000 by the will of George H. McCammon.

The Manhattan Eye, Ear, and Throat Hospital, New York, was left $100,000 by the will of Lloyd W. Seaman.

A trust fund of $235,000 to provide for medical research in the prevention of blindness is created in the will of Mrs. Louis Chapin Norton, Provincetown, Massachusetts.

The first Latin-American ophthalmological congress will meet at Santiago de Chile February 2 to 6, 1931, under the presidency of Professor Charlin.

The United States Trachoma Hospital, maintained at Knoxville, Tennessee, by the United States Public Health Service since 1923, is reported closed, Dr. James Edward Smith, medical officer in charge, being transferred to the headquarters of the trachoma division of the Service at Rolla, Missouri.

The United States Civil Service Commission states that it is in need of an acting assistant surgeon qualified in trachoma work for the United States Public Health Service, Ellis Island, New York; salary $3,000 a year.

A letter signed by Dr. Park Lewis, Dr. William Campbell Posey, and Mr. L. H. Carris appeals to the ophthalmologists of this country to endeavor to interest some of their wealthy patients in making substantial contributions to the International Association for the Prevention of Blindness which was formed at the Amsterdam meeting of the International Congress of Ophthalmology. Contributions should be mailed to Mr. L. H. Carris, 370 Seventh Avenue, New York.

Ground has been broken for the new eye and ear hospital unit of the medical center of the University of Pittsburgh. It will comprise one ten-story wing of the main structure housing the Presbyterian Hospital and will have a capacity of more than one hundred beds. The main part of the building, where the Presbyterian unit will be located, will contain more than two hundred beds. Building plans are designed so that three other wings, to be devoted to other specialties of medicine, can be added later, giving a total housing capacity of seven hundred patients and dispensary facilities to care for one hundred thousand visits a year. The necessary funds for the eye and ear unit have been subscribed.

The new twelve-story addition to the New York Polyclinic Medical School and Hospital, constructed at a cost of more than $1,500,000, was formally opened December 29, 1930. Seven floors will be devoted exclusively to clinics, while four floors are for private patients. There are seven new operating rooms with the most modern hospital facilities. The new addition will increase the capacity of the hospital to about four hundred and fifty patients a day and will provide for more than six hundred out-patients. Thirty thousand physicians have taken post-graduate courses in the Polyclinic during the fifty years of its existence.

The fifth annual spring graduate course of the Gill Memorial Eye, Ear, and Throat hospital, Roanoke, Virginia, in ophthalmology and other subjects, will be held at Roanoke, Virginia, March 23 to 28, 1931. The guest members in ophthalmology will include: E. B. Burchell, New York; Andrew A. Eggston, New York; J. W. Jervey, Greenville, South Carolina; H. Maxwell Langdon, Philadelphia; Walter I. Lillie, Rochester, Minnesota; R. C. Lynch, New Orleans; Bernard Samuels, New York; Webb W. Weeks, New York. Technical demonstrations will also be given by representatives of the American Optical company and the Bausch and Lomb Optical company. The class is limited to twenty-five men, and the fee for the course is fifty dollars. Information may be obtained from Dr. E. G. Gill, Box 871, Roanoke, Virginia.

Societies

The Pacific Coast Oto-Ophthalmological Society will hold its annual meeting at Los Angeles in May.

At the annual meeting of the Texas Ophthalmological and Otolaryngological Society held recently in Houston, Dr. William R. Thompson of Fort Worth was elected president; and Dr. A. F. Clark of San Antonio, secretary.

Dr. A. Magitot of Paris, France, will be the guest of honor of the Section on Ophthalmology of the American Medical Association at its meeting in Philadelphia during the week of June 8, 1931.

An Academy of Ophthalmology and Otolaryngology, for the presentation of clinical cases, has been organized in Iowa, with Dr. William F. Boiler of Iowa City as secretary. The first meeting was held February twelfth, with Dr. Gordon F. Harkness of Davenport presiding.

The program of the section on ophthalmology of the College of Physicians of Philadelphia, January fifteenth, consisted of

papers by Drs. G. E. de Schweinitz on "Homonymous hemianopsia in diabetes"; by Frederick Krauss on "Cysts of the orbit: report of two cases"; by Joseph V. Klauder and (by invitation) Harold F. Robertson on "The treatment of interstitial keratitis: an analysis of 105 consecutive cases, with particular reference to involvement of the other eye"; and by T. B. Holloway and (by invitation) W. E. Fry on "Unsuspected brawny scleritis in a case of retinal detachment with secondary glaucoma".

The Sioux Valley Eye and Ear Academy, which comprises members from Iowa, Nebraska, and South Dakota, held a meeting in Sioux City on January twentieth. The program of the eye section included an address on "Retrobulbar neuritis, its etiology and treatment", by Dr. W. I. Lillie of the Mayo Clinic.

The annual meeting of the Ophthalmological Society of the United Kingdom will be held in London April 23 to 25, 1931. The annual meeting of the Section of Ophthalmology of the Royal Society of Medicine will be held on June 12, 1931.

The second annual meeting of the Association for Research in Ophthalmology will be held in Philadelphia on Tuesday, June 9, 1931, just before the meeting of the Section on Ophthalmology of the American Medical Association. The special topic selected by the trustees for this year's meeting is "chronic uveitis". The subject of "light" is to be considered in 1932 and "optic atrophy" in 1933.

Personals

Dr. William H. Wilmer has recently been confined to his home on account of a severe cold.

Dr. M. Uribe Troncoso, who is under sanitarium care at Trudeau, New York, is making very satisfactory progress.

Dr. Edward Jackson spent most of January away from Denver, attending regional meetings of the American College of Surgeons at Saint Joseph, Missouri; Little Rock, Arkansas; New Orleans; Nashville, Tennessee; and Cincinnati.

Dr. George F. Suker of Chicago, by invitation, will address the Pittsburgh Ophthalmological Society on February twenty-third on "Retinal complications in cardiovascular lesions".

Dr. Casey Wood has spent the last year in London and in travel on the continent. He is now settled for the winter at the Hotel Eden in Rome, where he will continue his preparation of a volume for publication by the Oxford University Press next year.

Dr. Frank L. Dennis announces that he has left Colorado Springs, and that his office has been acquired by Dr. H. B. Beeson, who was formerly at Grand Forks, North Dakota, and who will practice diseases of the eye, ear, nose, and throat.

Binders for the American Journal of Ophthalmology

One of our subscribers has suggested that many readers of the Journal, especially those who do not permanently bind their volumes, would find it convenient to use a system of loose binders, in which might be preserved either the current issues or the complete volumes of the Journal. The management of the American Journal of Ophthalmology has been in correspondence with a well known firm of manufacturers, and this firm has submitted an excellent binder which could be supplied at $1.75 (plus postage). Anyone using such a binder would have to punch two holes in each issue of the Journal, and the binder together with the mechanical punch and metal guide necessary for this purpose would be supplied at an inclusive price of $3.00 (plus postage) but the punch and guide would not have to be renewed for a number of years. Will any readers of the Journal who are interested in this arrangement kindly address:

Binders, American Journal of Ophthalmology,
530 Metropolitan building,
Denver, Colorado.